MODERN Machine Shop

REG. U. S. PAT. OFF.

*A Magazine for Machine Shop Executives*

HOWARD CAMPBELL, Editor

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## CONTENTS



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MODERN Machine Shop

MAY, 1930

CINCINNATI, OHIO VOL. 2, NO. 12

# Power Speed Reducers Aid Locomotive Repairs

*By* H. H. HENSON

A SMALL amount of power, properly applied, can be made to perform a huge task. This fact has been known for thousands of years, as evidenced by the statement of one of the ancient Greeks that if he had a lever long enough, he could move the earth. Leverage is all that is necessary, and leverage can be applied in many forms, but modern industrial efficiency demands that it be applied intelligently.

The most common of the modern forms of applying leverage is through the use of the power speed reducer, by means of which a small high speed power unit can be made to do tasks that would otherwise require a large, low speed unit. The small high speed power unit is more efficient, just as powerful when coupled with the proper equipment, and less costly than the large unit. The majority of the power units referred to are in the form of electric motors, but the term may apply to air motors or other kinds of units as well.

Power speed reducers can be made to perform valuable service in locomotive repair shops, and the use of

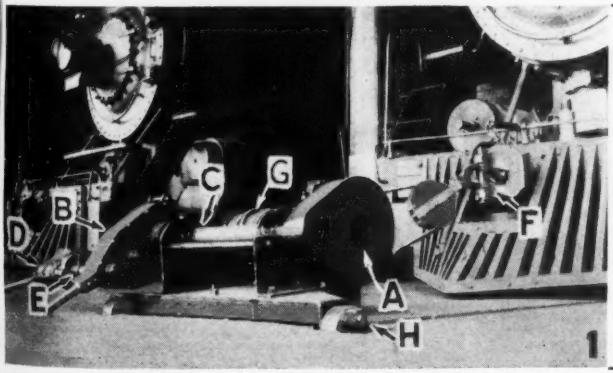



Fig. 1 — The air motor, driving a speed reducer attached to a winch, pulls the locomotive.

such units for locomotive work is increasing. Speed reducers can be used with either air or electric motors to move locomotives back and forth over the pits, raise them so that tires can be changed, drive boring bars for boring valve chambers, pull cylinder bushings and valve chamber bushings out and in, and so on. An example of the manner in which a speed reducer can be applied to a winch so that a portable air motor can be used to pull a locomotive is shown in Fig. 1.

In this illustration the air motor **D** is driving a pinion in the speed reducer **B**, the pinion driving a set of compound gearing through which power is transmitted to the drive shaft **C** of a spur-geared winch. The gears of the winch have a ratio of 3 to 1, the large gear (indicated at **A**) being attached to the end of the rope drum **G**. The drum is 7 in. diameter and 40 in. long, and the surface of the entire length of the drum is serrated to take a $\frac{5}{8}$-in. wire cable. The serrations are cut $\frac{3}{8}$-in. deep on a $\frac{3}{4}$-in. pitch, to keep the cable from interwinding on the drum.

The gears in the speed reducer **B** are 6 P., 12 to 1 ratio, and are encased in an oil-tight steel housing. The gears run in oil or light grease which is pumped in with a grease gun. All gear shafts run in bronze bearings. The shaft of the driving pinion is made with a Morse No. 5 taper shank and protrudes from the housing so that it can be inserted into the sleeve of the air motor, indicated at **E**. The complete outfit is

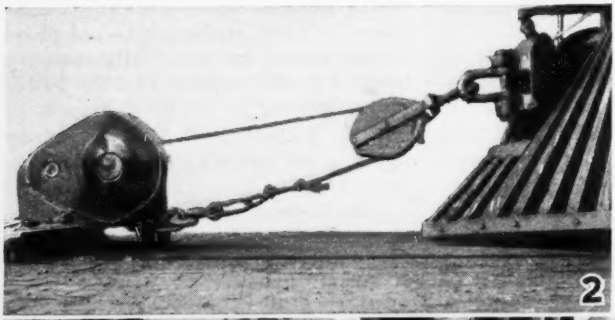
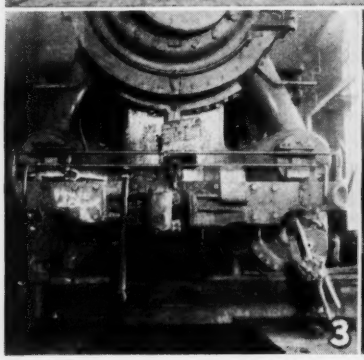
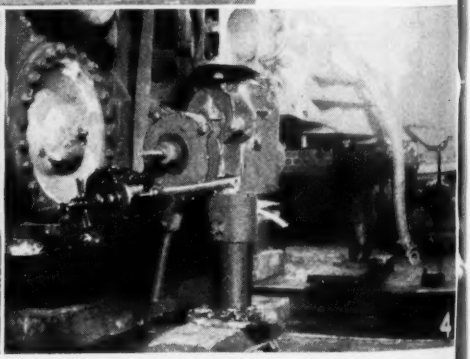


Fig. 2 — Side view of winch, showing method of attaching to locomotive. Fig. 3—Using an air motor to raise a locomotive. Fig. 4—Close-up view showing method of attaching air motor to power jack.





supported on a frame of heavy steel plate, anchored to the stop-blocks **H** by a 2-in. rod which passes through

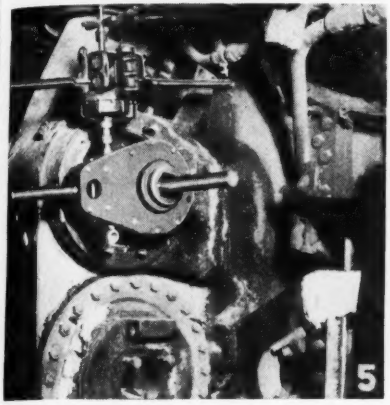


Fig. 5—Using an air motor and gear reduction unit to pull a valve bushing into place.

both blocks. The wire cable is passed around the sheave of a pulley and the end is then anchored to the frame.

In order to provide means for attaching the cable to the locomotive, a clevis jaw **F** is pinned to the front draw head. A side view of the equipment with the pulley hooked to the locomotive is shown in Fig 2. The pulley is necessary only when moving the heavier types of engines; the smaller ones can be pulled from the winch direct. By hooking the cable to the end of another cable that has been attached to the rear of the locomotive and passed around another block-sheave, the locomotive can be pulled backward as well as forward.

An 180-ton locomotive can be raised 12 inches in three minutes by the use of speed reducers applied to jacks as shown in Figs. 3 and 4. These reducers are of a smaller size, using 8 P. spur gears, 5 to 1 ratio. In Fig. 5 is shown one of the smaller units set up to pull a valve chamber bushing into place, eliminating the necessity for using the usual wrench and screw and saving both time and hard labor. The equipment used as shown in the illustration consists of an air motor, a draw bolt, two end plates, a ball thrust bearing, and a bronze nut, assembled as shown in Fig 6. The draw bolt is indicated at **A**, the end plates at **B**, and the thrust bearing **C**. A 3-in. diameter bolt is used to pull in valve bushings, the bolt used to pull in the cylinder bushings being 3½ in. in diameter. The length of the bolt is governed by conditions. A standard thread, to take a 3-in. or 3½-in. nut, is cut on one end, and 36 inches of square thread, to correspond with the thread in the barrel of the worm gear in the speed reducer, is cut on the other end.

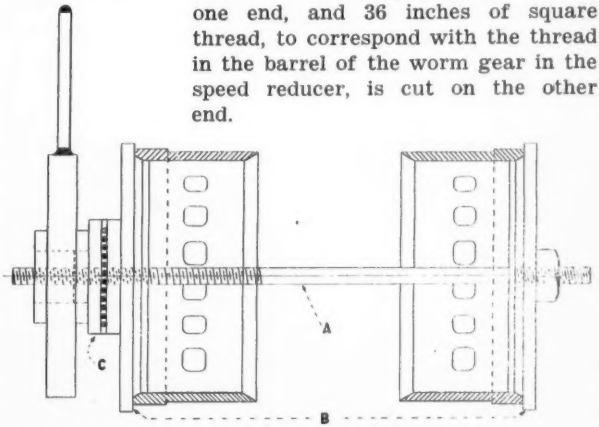
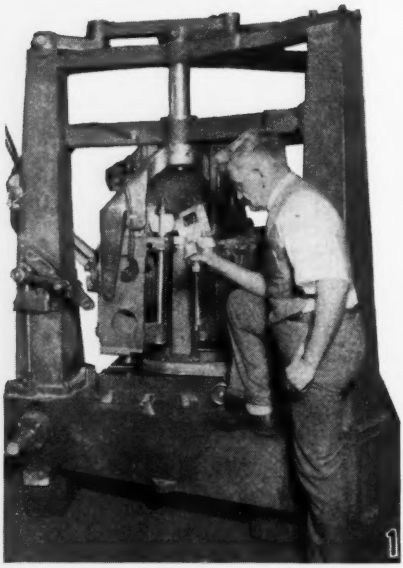



Fig. 6—Details of bushing-puller.

The operating mechanism of the reduction unit consists primarily of a steel worm 7 in. long by 3 in. dia-

(*Continued on page* 48)



# "Let The Machine Do It"

*By* EDMUND LEDUC

THE above slogan expresses perfectly the idea upon which the success of the Miami Tool & Die Co., of Dayton, Ohio, is founded. This shop has grown in fifteen years from a one-man shop to a plant which covers approximately 60,000 square feet of floor space and employs some one hundred men. The president, W. F. Miller, is a practical tool and die maker, as well as a designer and engineer of recognized ability. Associated with him are Wm. E. John, general manager, and E. E. Rhodes, designing engineer.

These men adhere strongly to the belief that anything that can be done by hand can be done—and better—by mechanical means, and this idea has brought the shop a great many opportunities to develop and build

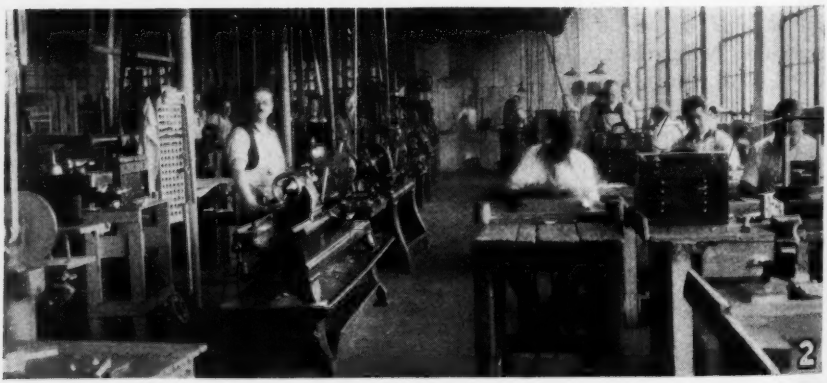
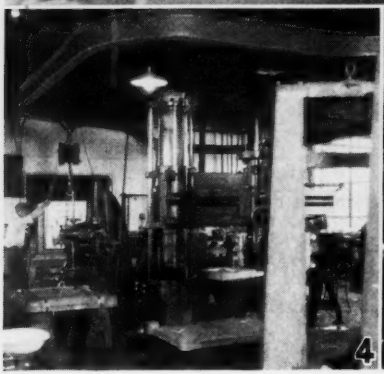


Fig. 2—Jig and fixture work is handled on this side of the shop. The grinding department is at the rear.



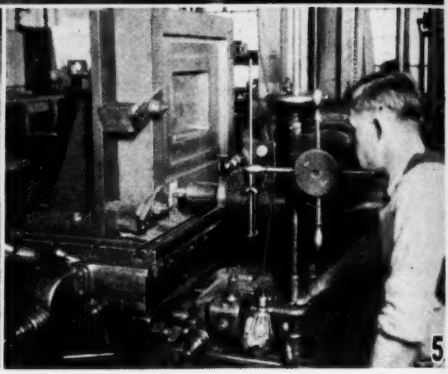
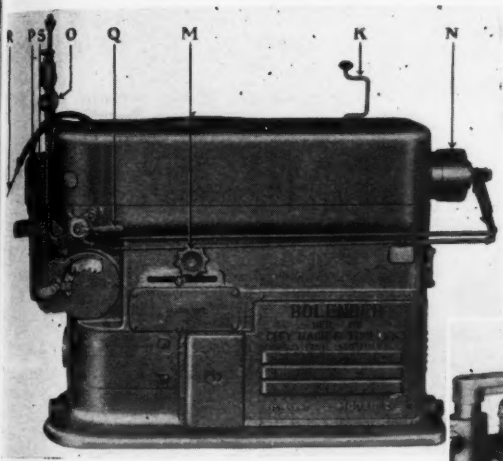


Fig. 3—Heavy die work is handled in this department. Fig. 4—A monorail trolley system serves the larger machines and extends to the benches. Fig. 5—Machining a "Frigidaire" panel die on a G & L Horizontal Boring Machine.

special machines. The illustration at the head of this article shows one of the designers examining the product of a machine which he designed to perform the somewhat intricate operation of forming the heel for a woman's shoe. The task involved in the development of this machine may be considered as a fair example of the type of problems that are put up to this organization for solution.

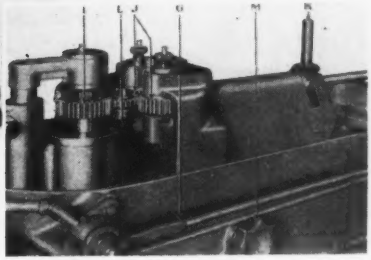
The shop is well-equipped for fine tool, die and special machine work. The equipment includes forty benches, arranged along the two sides of the plant as shown in Figs. 2 and 3, with the batteries of lathes, milling machines, drill presses, and other machines occupying the center of the shop. An overhead monorail, carrying several three-ton chain blocks, is located so that it serves both the heavier of the machine tools and the benches, thus making it possible to transfer heavy work to practically any part of the shop without difficulty. Figure 4 shows a mechanic in the act of lowering a large die shoe

# ANNOUNCING The New BOLENDER Model No. 2 GEAR BURNISHER




Burnisher "I" is driven by power. Burnishers "J" are loosely mounted on spindles carried by a slide adjusted by "K." Gear to be burnished is carried on mandrel integral with screw "L," adjusted by turning knob "M." Pressure to burnishing rolls supplied by air through cylinder "N," controlled by air valve "Q."

To start burnishing cycle depress switch handle "P," reverse mechanism automatically controlled. Nozzle for cleaning purposes marked "R," oil reservoir "S."



MODERN machine design demands perfect, smooth-running gears. The New Model No. 2 BOLENDER GEAR BURNISHER provides the ideal means of perfecting the bearing surface of any gear from 1½" to 14" O. D.x2½" face as it comes from the gear cutting machine.

One outstanding feature of this machine is a successful completely automatic burnishing cycle. Another is that the gear lies in a horizontal position with the center line vertical. This eliminates all overhang or unevenness in pressure due to uneven weight distribution.

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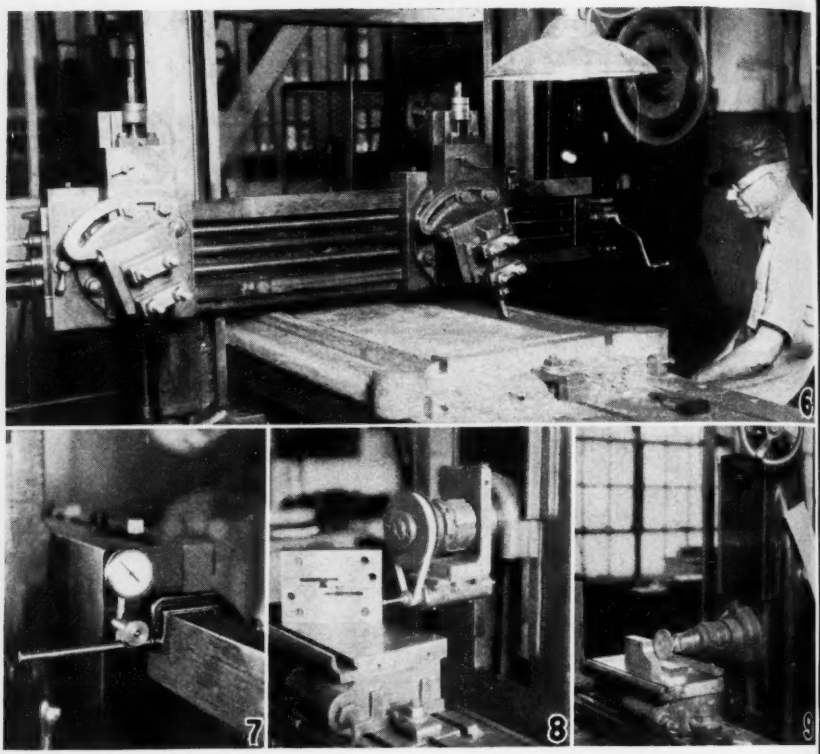
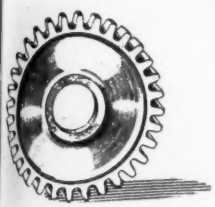


Fig. 6—Planing the shoe for the "Frigidaire" panel die. Fig. 7—A dial indicator clamped to the planer rail aids in setting the tool. Fig. 8—An internal attachment, operated from a wood pulley on the machine spindle, converts this surface grinder into an internal grinder. Fig. 9—All radii are ground, saving time and producing better work.

onto the table of a Giddings & Lewis horizontal boring machine. This die, which is a drawing die for one of the panels for the "Frigidaire," is shown in process of machining in Fig. 5.

The operation shown in Fig. 6 is that of planing a die shoe for a "Frigidaire" panel. As the operator is working to a limit of .001 inch on a dimension of 28.500 inches, he has eliminated the necessity for "cutting and trying" in order to obtain an accurate tool setting by the use of a dial indicator which he has clamped to the rail of the machine as shown in the illustration, Fig. 7.

The grinding equipment, which is grouped to form a department, includes four B. & S. surface grinders, two large B. & S. cylindrical grinders, and two Herald internal grinders. Figure 8 shows a surface grinding machine to which an internal grinding attachment has been applied, the external grinding wheel having been removed to allow for the substitution of a wood pulley. The grinding wheel, which is ⅛-in. in diameter, is used to finish the slots in a die that is being made for the Western Electric



# *One Gear Shaper versus 6 Other Machines*

THIS cast brass meter gear, which has 32 teeth, 32 pitch, 14½° pressure angle, 3/16 inch face, was formerly cut on special bench type machines.

It required six of these special machines and six operators to produce 4500 gears in eight hours. One High-Speed Gear Shaper and one operator produced 5600 gears in eight hours, or 1100 more than were produced by six machines and six operators.

The cutting of these gears also demonstrated the economy of the Gear Shaper cutter. Formerly small milling cutters were used, which cost $0.80 each. These cutters produced 80 gears between "grinds", and a total of 800 to 1000 gears before the cutter had to be discarded.

The Gear Shaper cutter produced 6800 gears instead of 80 between "grinds", and approximately one million (1,000,000) gears before it was used up. Reduced to plain figures, including cost of sharpening cutters:

Milling cutter costs were $3.90 per 1000 gears. The Gear Shaper cutter reduced it to $0.10 per 1000 gears—a saving of $3.80 per 1000 gears, or more than 97% of former costs.

***Booklet No. 12 presents many other interesting facts—want a copy?***

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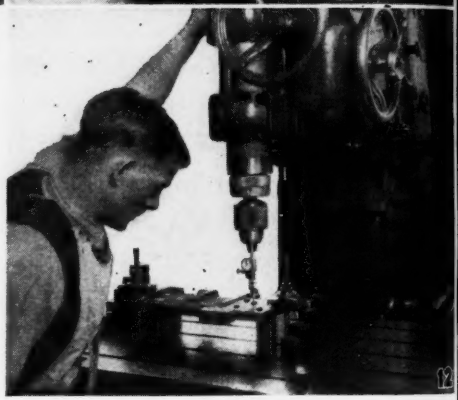

Fig. 10—Hand-filing has been largely eliminated by the use of this Rausch Rotary Filer. Fig. 11—Using a Dumore Grinder and emery pencil to smooth up the irregular surface of a small die. Fig. 12—Using the center finder to locate the center of a hole on the Pratt & Whitney jig-boring machine.

Company, of Chicago, Illinois.

The machine shown in Fig. 9 is being used to grind a radius in a die-section. The forming of radii, which is usually done by boring or by other means which involve more or less complicated clamping and tool setting, is accomplished here by the use of grinding wheels as shown. By keeping on hand a number of wheels of graduated sizes, any size radius desired can be obtained with but little dressing of the wheel and it is only necessary to add a full size wheel to the set when the smallest has to be discarded. The job can be set up quicker and a better job can be obtained by grinding the radii than by any other means.

An idea of the extent to which machines have replaced hand work in this shop can be gathered by reference to Fig. 10. The mechanic shown here is using a Rausch rotary filer, with a round file, to finish an irregular part of the surface of a section of a blanking die. The machine holds the file square with the sides of the die and operates the file at a much faster speed than is possible by hand, in addition to which it leaves the operator the use of both hands with which to locate and guide the work.

Another fine piece of labor-saving equipment is the Dumore flexible shaft grinder shown in use in Fig. 11. Irregular-shaped surfaces, such as the surface of the tray-handle die shown in process, can be finished much quicker, easier, and better with

# 7 DUMORE No. 3's show MARKED EFFICIENCY on difficult grinding job

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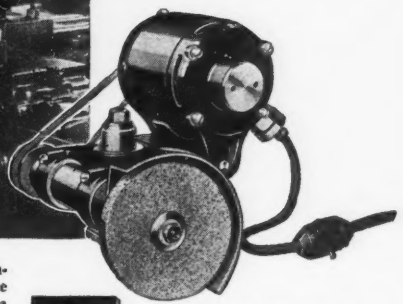

OPERATING at 40,000 R. P. M.; doing a precision internal grinding job on chuck jaws which range in size from 1/8" to 1"; in continuous operation 55 hours a week; 200 to 250 hours without adjustment! This is the record which a battery of seven Dumore No. 3 Grinders have made in the plant of the Jacobs Mfg. Co., Hartford, Conn.

The experience of the Jacobs Mfg. Company with the No. 3 grinders proved so satisfactory that it was recently decided to further step up production by gradually replacing them with the new and more powerful No. 5 Grinders. The No. 5's installed to date already show an increase in production of 15%.

In every respect Dumore Grinders have lived up to expectations in the Jacobs plant. On one operation, particularly, which imposes a terrific test on the grinder, the sturdy construction, solid spindle shaft, self-oiling features, air-cooled and variable speeds make it exceptionally efficient.

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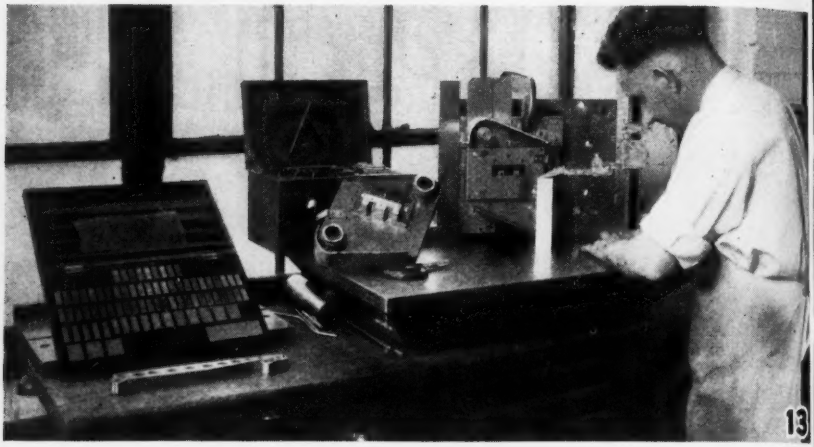

Fig. 13—A part of the inspection equipment.

a tool of this kind than by the hand method. Using a tapered wheel or "emery pencil" of small diameter, operating at a speed of 40,000 r.p.m., an otherwise laborious task is accomplished in a comparatively short time.

Probably the finest piece of equipment in the shop is the Pratt & Whitney jig-boring machine shown in Fig. 12. The operator is using a "Schwieterman" center finder to locate the center of a hole while the spindle is running, this tool making it possible to locate the center in a minimum of time. The spindle of the tool rotates with the spindle of the machine while the test indicator is held stationary, and a center can be located by this means, within .0002 inch, in less than a minute. The dial indicators that are built into the machine, together with the end-measures and micrometers that are furnished with the machine, provide a positive method of locating and boring holes to an extreme accuracy in a minimum of time.

Each tool, die, jig or special machine is given a thorough final inspection before it is released to the customer, and upon the inspector falls the responsibility for any future complaints. His task is simplified, as far as possible, by the use of precision gages of the most modern types. A part of the inspection equipment is shown in Fig. 13.

One of the outstanding reasons for the success of this company is its strict adherence to delivery dates. When a promise of shipment has been given to a customer, this date automatically becomes a law to everyone concerned, and a percentage of the work done on each tool is checked daily and compared to the date promised. If this percentage does not compare favorably with the promised delivery date, immediate steps are taken to maintain the proper proportion in order to assure everyone concerned that the tool in question will be forwarded to the customer as promised. It is equally important that the tool pass a rigid inspection before being shipped to the customer, as the members of this

(*Continued on page* 38)

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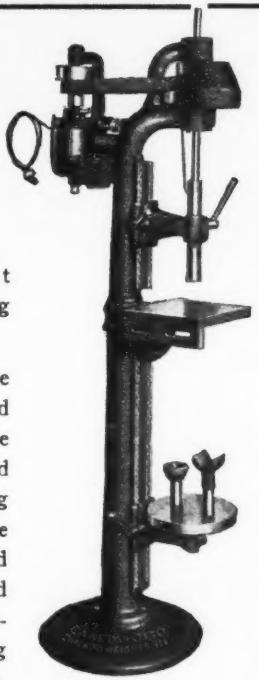

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# Modern Tooling Practice, II

By Frank W. Curtis

WHEN a designer is able to determine the best method of finishing any part in a given mechanism, and when he is at the same time able to lay out and design the necessary tools, he may be classed as a tool engineer. This field offers excellent opportunities for the progressive mechanical engineer, and the results obtained by careful study of the subject are unusually gratifying because they are of such great importance in helping to reduce the cost of manufacturing. And costs are of prime interest to any manufacturer.

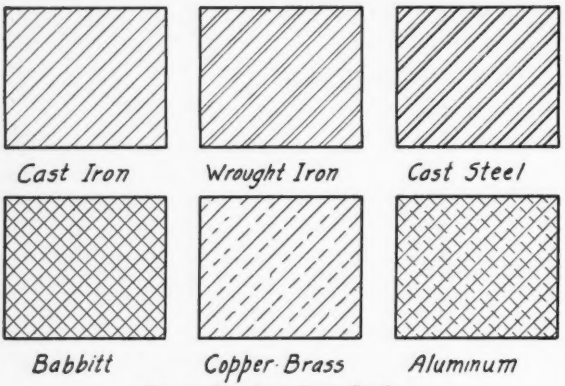


Fig. 6—Standard Cross-Sections

Certain methods of procedure in connection with tool drawings and tool-designing practice have been so universally adopted as to have become practically standard practice, including the organization of the tool drafting room from an economic standpoint. Tool drawings are usually made in standard sizes, such as 9 x 12 in., 12 x 18 in., 18 x 24 in., 24 x 36 in., and 36 by any desired length. In making tool drawings, a standard method of cross-sectioning should be used so that the task of deciphering the drawings will be simplified as far as possible. The section marks most commonly used are reproduced in Fig. 6.

Many individual manufacturers have standardized certain units used in connection with tool construction in their plants. Any contribution that can be made in this direction which will tend to substantially reduce tool costs should be considered thoroughly. Standardization will stimulate the use of tools for parts that were previously made without tools. In Fig. 7 are shown a representative group of parts that can be standardized to suit individual requirements. Those shown represent bushings, screws, handles, knobs, and handles. Other parts such as washers, angle plates, legs or feet, taps and threads, bolts, and dowel pins, can also be standardized. Such designs should be recorded in the form of a loose leaf data-sheet book and kept available for reference purposes. It will also be found advisable to include sheets tabulating the sizes of steel flats, rounds, and so on, which are carried in stock, with lists of gage sizes, drill sizes, and other tables

### Units for Jigs and Fixtures

A jig or fixture is usually composed of a main body, or frame, and a number of supplementary units, such as bushings, bushing plates, clamps, locating blocks, and plungers.

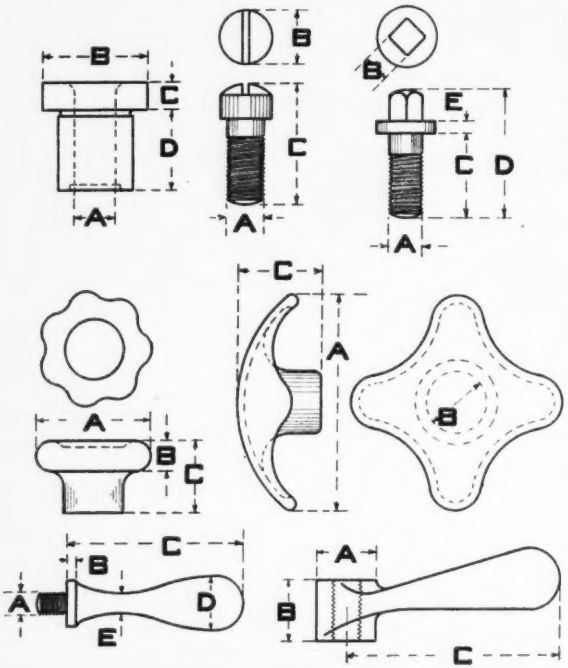


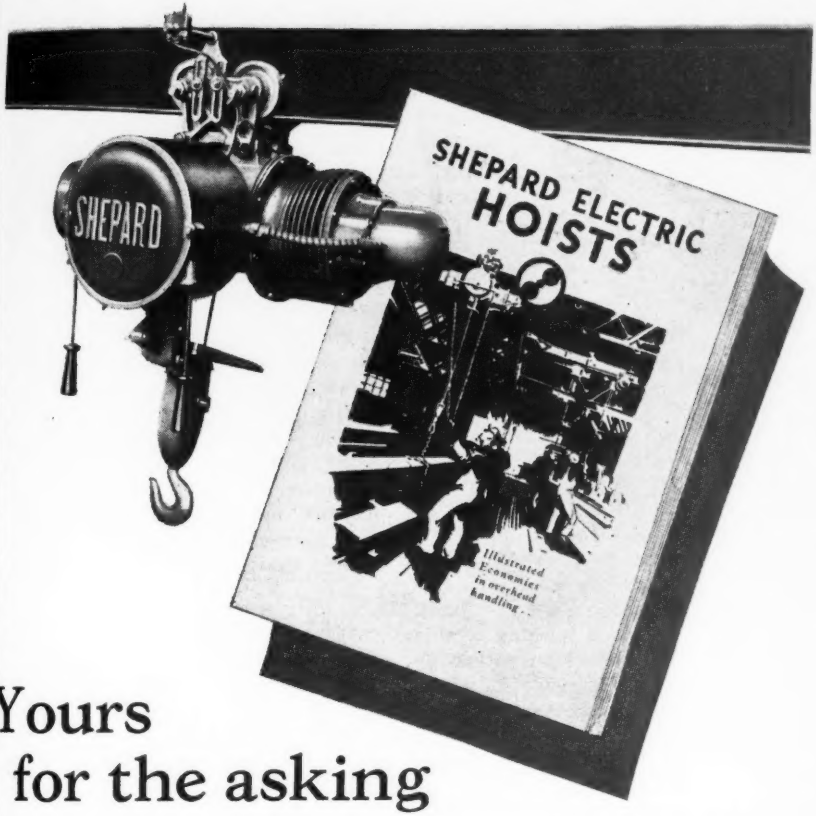

Fig. 7—Standardized Jig Parts.

The design of these supplementary units is as essential as the design of the body itself, because much depends upon these units in making the jig or fixture practical and economical. For example, it is quite necessary that an adequate and rapid clamping method be provided in any form of tool in which a workpiece is to be held, and naturally the results will not be gratifying if a weak clamping unit is employed. For this reason, great care should be taken to apply proper supplementary units in accordance with the type of work to be machined, the machine to be used, and the amount of production required.

There are many advantages to be obtained from the use of standard drill-jig bushings. To some extent drill and reamer bushings should be standard just the same as drills and reamers. In some cases a special type of bushing is required, but in the majority of jigs it will be found quite possible to adopt some form of standard design both to facilitate interchangeability, and so that bushings will be available for replacement without delay.

Bushings receive a great amount of wear, therefore they should be made of the finest grade of tool steel, properly hardened and ground. When close tolerances are required it may be necessary to replace bushings often, depending, of course, upon the service required of them. For this reason it will be found advantageous to standardize the general proportions of bushings, and design the jig leaf or body around these proportions. Adhering to this practice will make it possible to carry a surplus stock of finished bushings, or bushings partly finished, so that there will be no time lost when it becomes necessary to replace a worn or broken bushing.

A great many types of bushings are used in connection with drill-jig design, but generally speaking, there

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are only four that come within the scope of standardization. These four are illustrated in Fig. 8. The bushing shown at **A** is known as the plain stationary type, and is usually made

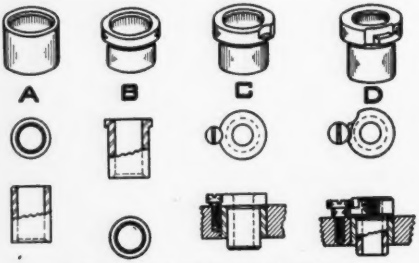


Fig. 8—Standardized Jig Bushings

for a press fit in the jig body. This type of bushing is also used as a liner for replaceable and slip bushings. The design shown at **B** is also a press-fit type of bushing, although it has a shoulder so that it can be pressed into the body against a boss or flat surface. A replaceable type of bushing is shown at **C**. A bushing of this design is usually stationary, and is held in place by a screw. It sometimes is used in combination with the plain bushing, and is used in jigs where severe work is required. The main feature of this type of bushing lies in that it can be replaced rapidly with little loss of time. The screw not only holds the bushing in place, but prevents it from turning. The bushing shown at **D** is known as the slip type, and is removable. This type of bushing is used in connection with jigs in which the work is drilled and reamed at one setting, both drilling and reaming being done with bushings of the proper size. The bushing is held in place by means of a fillister head screw, which fits into a bayonet-type lock machined in the head of the bushing.

### Bushing Proportions

Sometimes the drill jig is of such a nature that the wall or section into which a bushing is to be placed is thin, making it necessary to provide a bushing of special size. If the bushing is made as shown at **A** in Fig. 9, there is a likelihood of the drill running out of center, inasmuch as the height of the bushing is not sufficient to provide a satisfactory bearing. For the average bushing, the height **H** should be at least 2½ times the diameter **D.** This rule cannot be adhered to in all cases, but is a safe one to follow. In drilling small holes, the bushing hole is often five or six times higher than the diameter, which, of course, is not objectionable. The clearance between the bushing and the workpiece is important and should be provided according to distinct rules. The first is to have the bushing against the work, as shown at **B,** and

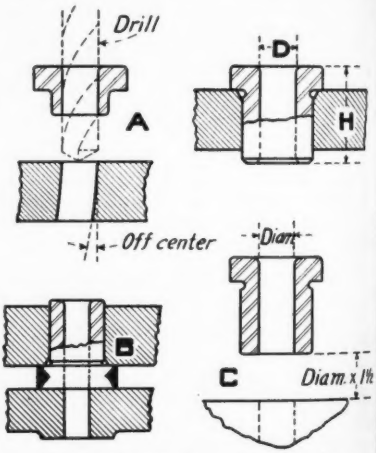


Fig. 9—Proportions of Jig Bushings

the other is to have the gap approximately one and one-half times the diameter of the drill, as shown at **C.** As in the proportions of the bushing, this rule can be altered slightly, but there must be sufficient clearance for

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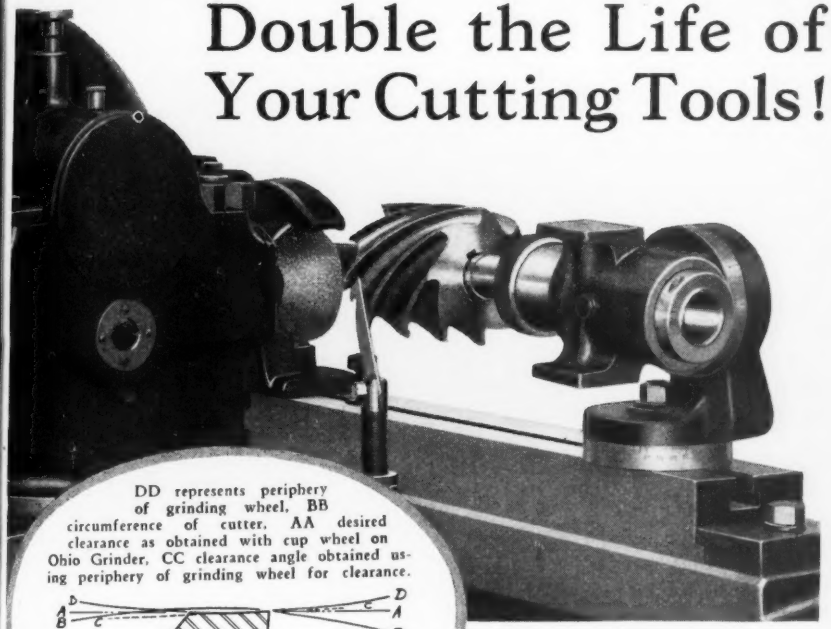


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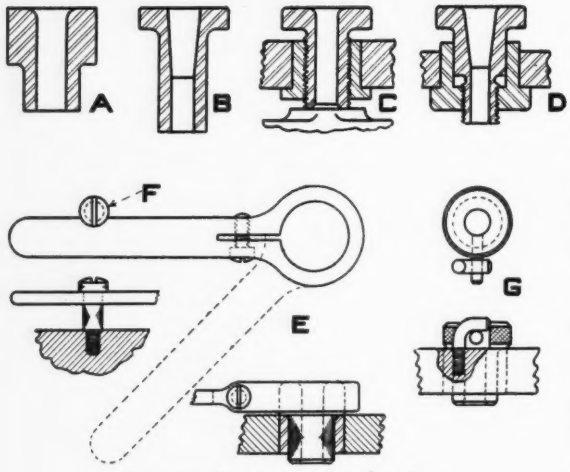



Fig. 10—Special Bushing Designs

chips. If the gap is made too small, chips will be apt to clog up in such a way that excessive heat will be generated during drilling. If the bushing lies directly against the work, the chips will have a free passage through the bushing.

When the proportions of a jig will not permit a standard form of bushing, a design such as shown at **A** in Fig. 10 will be found satisfactory. In this case, the head of the bushing is much higher than in the usual design. Taking the other extreme, where a long bushing is required, it will be permissible to relieve the upper proportion with a taper, such as shown at **B**. It is quite possible to have too large a bearing as well as too small a bearing, and this rule must be watched carefully.

At **C** is shown a screw-type bushing that is used for holding the workpiece in place as well as for alignment of the drill. Sometimes the heads of screw-type bushings are provided with pins to serve as handles for obtaining the proper clamping pressure. At **D** is shown another form of screw-type bushing, used where extreme accuracy is required. The bushing receives a bearing, and does not depend upon the threads for alignment.

Slip-type bushings are held in place by various means, the handle shown at **E** being one of the devices used for this purpose. The handle has a pinch binder that permits the clamping end to be securely fastened around the head of the bushing. The screw **F** is used to avoid rotation and to prevent the bushing from pulling out when the drill is raised. Another form of lock for slip-type bushings is shown at **G**. In this case the head of the bushing

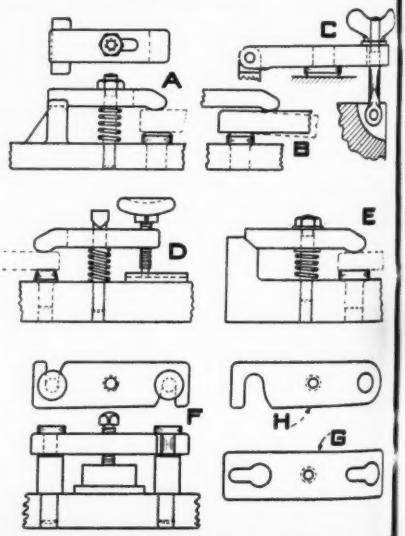
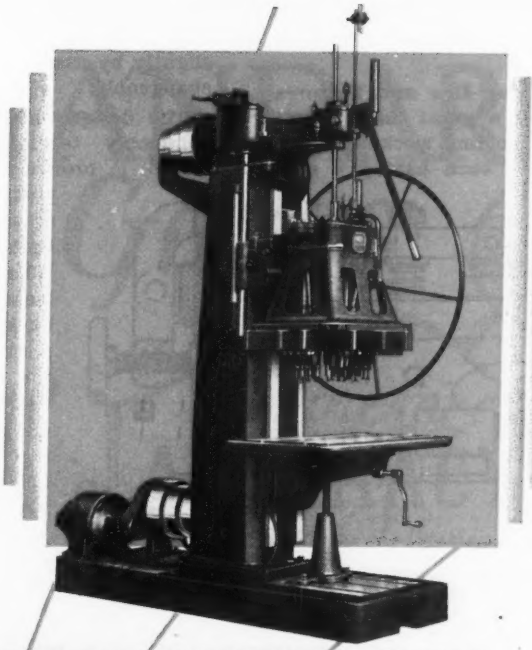



Fig. 11—Common Types of Clamps.



# NATCO MODEL C-13 ADJUSTABLE MULTIPLE DRILLER AND TAPPER

Above is shown the NATCO Model C13 Adjustable Multiple Driller and Tapper. It is a medium sized machine, having a wide range of speeds and feeds and embodies every feature which recent developments in machine shop practice have shown to be essential for the rapid and accurate production of multiple drilling and tapping work.

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is provided with a pin that fits over a hook-bolt fastened in the body of the jig.

**Clamps for Jigs and Fixtures**

There are a great many forms of clamps for holding workpieces in jigs and fixtures, each having a distinct field. Rapid semi-automatic type clamps are used when high production is required, whereas the simple type is used when time is not such an important factor. It is hard to give any definite rule regarding the use of clamps, because the nature of the work as well as the operation to be performed determines the type of clamp to be used. For this reason the designer must analyze the requirements carefully and then make a proper decision as to the style required. The clamps illustrated here offer a variety of miscellaneous uses. These designs can be altered slightly by using their features interchangeably.

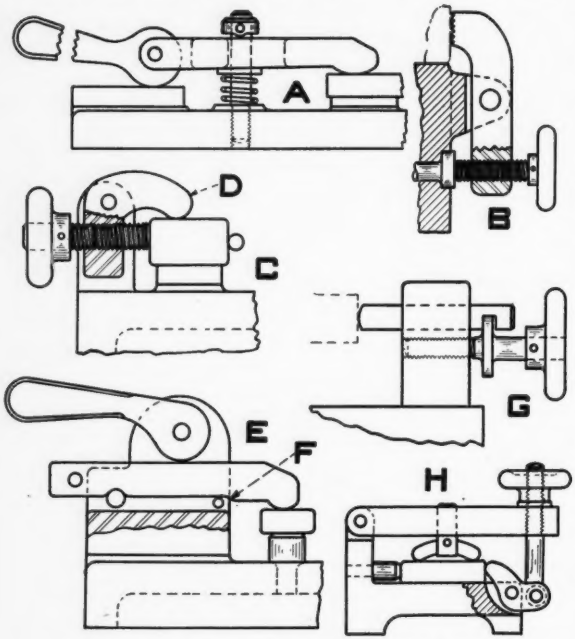


Fig. 12—Types of Cam-Lever and Multiple Clamps

The design shown at **A**, Fig. 12, commonly termed the strap-type clamp, is provided with a heel support at the rear end of a height equal to that of the workpiece. When the clamp is released, it can be drawn back out of the way to permit easy removal of the work. As shown, the clamping is done directly over a locating point, which is quite essential to avoid springing of the workpiece. If the clamps were made as shown at **B** there is a possibility that the work would be sprung as shown by the dotted lines. The clamp shown at **C** operates slightly differently in that an eye bolt, hinged on the fixture body and locked with a wing nut, is used to operate the clamp. In this case the clamp is hinged so that it can be swung back out of the way to permit loading and unloading of the workpieces. The clamp shown at **D** has the fulcrum point at the center and can be thrown back away from the work for loading purposes.

The clamp indicated at **E** is of the swinging type, in that it can be turned around after the clamping pressure has been released to permit removal of the work. The heel of the clamp is angular and bears against a projection made integral with the jig or fixture body. A removable type

of clamp is shown at **F**. In this case, the clamp has two C-slots, one at each end, which fit over the shoulder pins mounted on the fixture body.

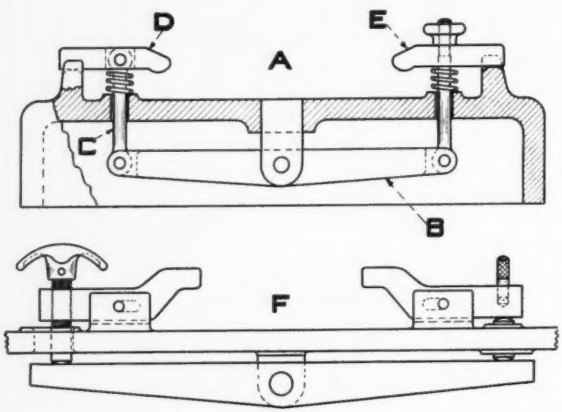


Fig. 13—Equalizing Clamps

When clamping pressure is released, the clamp can be turned slightly and removed entirely. The clamp **G** is also removable, although bayonet-type openings, instead of C-slots, are provided at each end. The clamp **H** has the C-slot at one end only, and can be swung around to permit loading.

Another variety of clamps is shown in Fig. 12. The clamp shown at **A** is of the cam type, a cam-handle serving to lock the clamp against the work. A clamp of this type is rapid in operation, and will be found satisfactory for a great many forms of jigs and fixtures. The lever type clamp **B** is very often used when an end clamping pressure is required. The clamp in this case works vertically instead of horizontally. A clamp of the double-acting type is shown at **C**. Here the clamping member **D** is pivoted in such a way that the work is held by clamping screw as well as by the clamp itself. Clamps of this type provide for a combination of both downward and end pressure.

Another form of cam clamp is shown at **E**. This clamp is of the built-up type and is rapid in operation. The body is made of a block of steel slotted through the center to suit the width of the clamp. A pin is used as a fulcrum point. When the clamp is drawn back, the raised section F strikes a pin located at the front end of the block, which causes the clamp to raise off the work. In other words, when the clamp is being brought into position, it does not rub on the face of the work until it has reached the approximate clamping position, preventing marring.

Sometimes it is necessary to provide a clamp that does not have any rotation, or torque, as it strikes the work, in which case the design shown at **G** will be found satisfactory. The screw is made with a shoulder that operates in a slot cut into the clamping pin. The action of the pin is directly in and out, so that there is no possibility of marring the workpiece, as is the case when a screw is used. At **H** is shown a clamp with a double action, operated by means of a hinged clamp that strikes the end of the work when the hand knob is tightened. At the same time a swinging-type clamp, located in the leaf, strikes the upper face of the workpiece.

Another form of double-type clamp, with one adjustment, is shown at **A** in Fig. 13. In this case, when the knob is screwed down on the handle, the hinged bar **B** is pulled upward at one end and down at the other, applying pressure to the eye bolt **C** and the clamp **D**, to which it is attached.

At the same time, the hinged-type clamp **E** is brought into action. Another form of double operating clamp is shown at **F**. The principle of this clamp is somewhat similar to the previous example, although the construction differs slightly.

A swinging-type clamp with a double action is shown in Fig. 14. This clamp is operated by the cam **A**, which fits into a milled slot located on the top face of the clamp **B**. When the work is to be released, the cam is raised in an upward direction and then turned, causing the clamp to turn with it. Releasing of the pressure permits the spring at the underneath side of the clamp to raise the clamp sufficiently to clear the work. The pin **C** is located in the fixture where it will prevent the clamp from

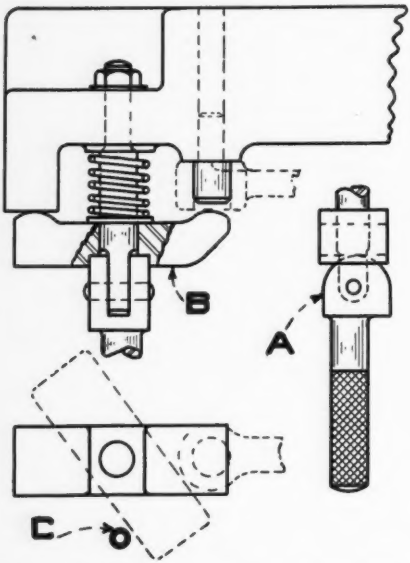


Fig. 14—Swinging-Type, Double-Action Clamp

turning too far when it is swung away from the clamping position.

A combination clamp and spring plunger, operated with a single action, is shown in Fig. 15. In this case the clamping pressure is obtained by the cam handle **A**, which

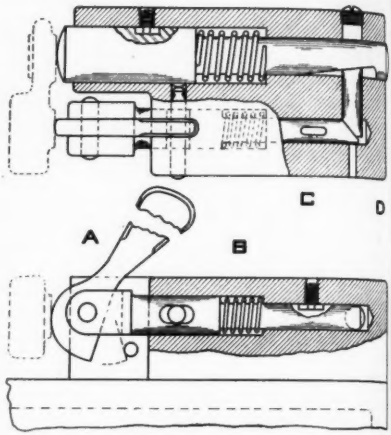


Fig. 15—Combination Clamp and Spring Plunger

strikes the face of the workpiece. This action causes the clamp to push back slightly and carry the yoke pin **B** with it. The end of this pin, through an angular face, causes a transfer of the pressure to the spring plunger, locking pin **C**. This design can be altered slightly to suit prevailing conditions and will be found convenient and rapid for a variety of clamping arrangements.

## "Let the Machine Do It"

(*Continued from page* 22)

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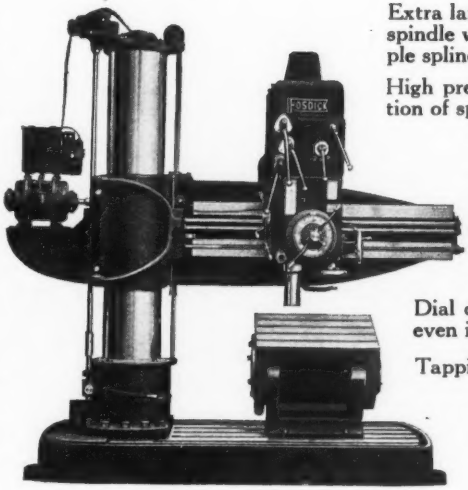


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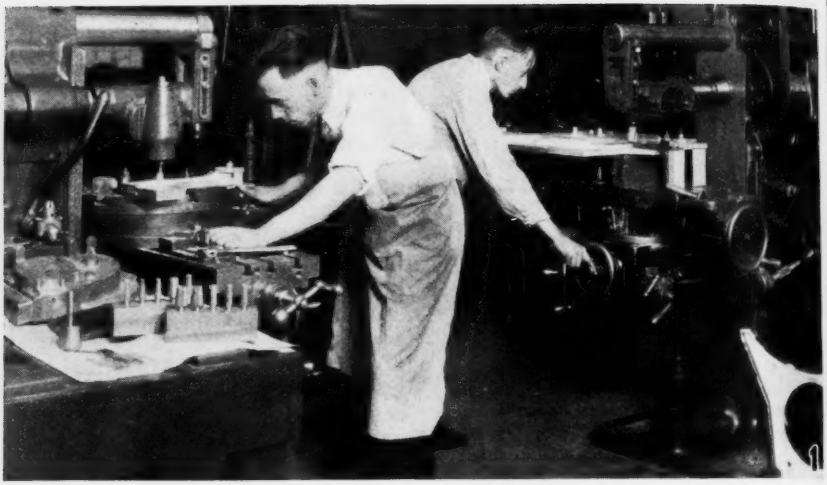


Fig. 1—Using horizontal milling machines, equipped with milling attachments, for profiling irregular surfaces on metal patterns.

# An Accessory Unit That Simplifies Difficult Operations

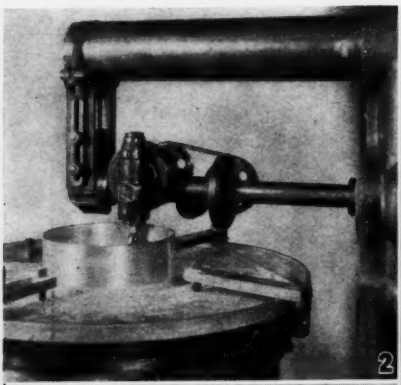
*By* DONALD A. CLARK

MANY of the mechanical units that have been built in the past have fallen short of perfection, due, not to lack of ability on the part of the designer, but rather to lack of facilities for producing the units according to the design. In many cases the designer's ideal has been incapable of achievement even by hand work, which is laborious and costly, at best. And even where a semblance of the desired result has been obtainable by the use of hand tools, the result has been crude compared to the machine-finished surfaces of other parts of the unit.

The first rule of the modern machine designer is, however, that anything that can be done by hand can be done by machine—and done better—therefore it is not surprising that a mechanical unit should be produced with which many hitherto difficult tasks can be accomplished with ease. This unit is the Universal milling attachment, which is illustrated here in use on a variety of jobs.

The illustration at the top of this page, Fig. 1, shows two milling machines which, with the aid of milling attachments, have been adapted for profiling the irregular surfaces of metal patterns. Such a task could as easily be handled on a profiling machine, but the attachment makes the purchase of such a machine unnecessary. In a shop where the need for such a tool is intermittent,

*(Photos and data courtesy Porter-Cable Machine Co.)*



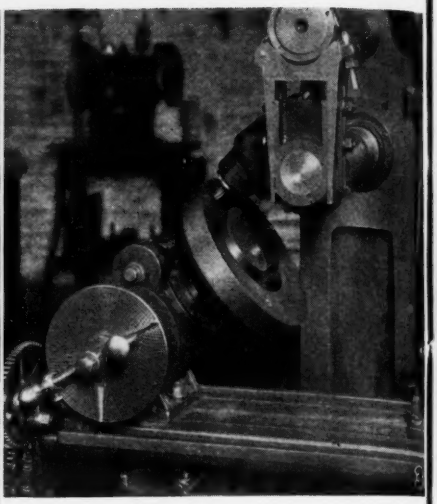


Fig. 2—The work shown here is too large to be handled in any other machine in the shop. By using the milling attachment and a rotary table, it is easily handled on this miller. Fig. 3—The first one of these cams was drilled, chiseled and filed to shape in eight hours. The remaining six were finished on this machine in four hours. Fig. 4—This job—Milling an oil groove close to an overhanging shoulder—would be difficult by any other method.

or where floor space is at a premium, the milling attachment solves the problem very nicely. This attachment is particularly adaptable for use in the production of patterns or dies for drop forgings, as it can be adjusted to any angle desired and a straight cutter used, thus obviating the necessity for an angle cutter. The natural sequence is that a stock of cutters of various angles is unnecessary and the total inventory of cutters can be kept to the minimum.

The job shown set up in Fig. 2 is not particularly difficult, but the piece is too large to be swung in the only other machine on which it could be handled in this shop—a vertical miller. By locating the piece on a circular table attachment and using a special extension sleeve, the operation can be easily handled. With this outfit, the plain miller can be adapted for work which would be much too large for the average size vertical miller and which could otherwise only be machined by the use of a horizontal boring machine.

The piece shown set up on the machine illustrated in Fig. 3 was one of seven cams which were to be used in special machines for use in a piano factory. The first cam was made by the old-fashioned method of drilling,

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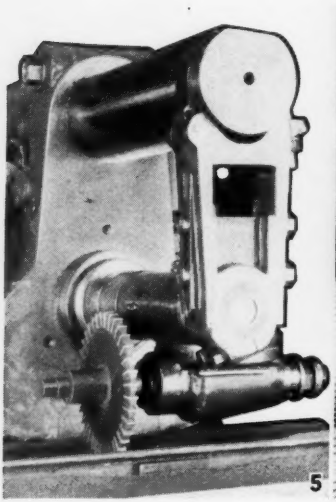
chiseling, and filing, the job requiring eight hours. As the need for the cams was urgent, the milling attachment shown in the illustration was procured and applied to the horizontal milling machine, as shown, together with an index head to hold the work. The remaining six cams were finished in four hours. Thus not only was a remarkable saving in time made by the use of the attachment, but there was no comparison between the two jobs as to accuracy and finish.



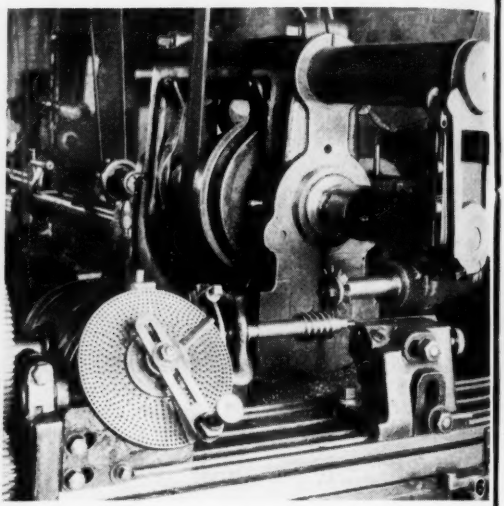


Fig. 5—Here the attachment is shown adapted for milling a 7½-in. radius in a cast iron part for an ironing machine. Fig. 6—Milling an 8-P steel worm for an experimental job.

An example of the type of job which is practically impossible of accomplishment without a tool of this kind is shown in Fig. 4. The operation is that of milling oil grooves $\frac{5}{16}$-in. long in the surface of a machine part, the end of the groove being located close to a shoulder under a flange of 30 degrees angle. It would, of course, have been possible to chip the grooves in these parts by hand, using a hammer and cape chisel, but such a job would have been rough and irregular, both as to width and depth, and the operation would have been slow. By using the attachment shown, each groove was completed in three minutes.

A still more interesting application of the milling attachment is shown in Fig. 5, where the tool, applied to a plain miller, has been swung to the horizontal position so that a radius can be milled in the work as shown. The piece is a cast iron shoe for an ironing machine, and the cutter is a 7½-in. diameter side mill. The radius is milled the entire length of the piece for which, without the attachment, a milling machine with 24 in. table travel would have been required. The operation was performed with the equipment shown, however, without difficulty.

The flexibility of the attachment is clearly shown in Fig. 6, where the

operation of milling an 8-P. steel worm for an experimental job is shown in process. To assume that this equipment is as efficient for cutting gears as the gear cutting machine would be an error, but for tool or experimental work, where one piece of a kind is to be made, the milling attachment is highly efficient. Many other toolroom jobs are rendered simple by the use of such a tool; the milling of keyways in shafts or other parts, especially where the keyway is of an odd width; cutting oil grooves or boring holes in vertical or horizontal surfaces; and so on. With such equipment, the shop problem of yesterday becomes the commonplace of today, the plant executive is relieved of the task of finding ways and means to perform difficult operations, and the machine or tool designer can take more liberty in matters of design, knowing that intricate operations are now possible of accomplishment without exorbitant costs.

## Dissolving Metals With Mercury

*By* R. H. KASPER

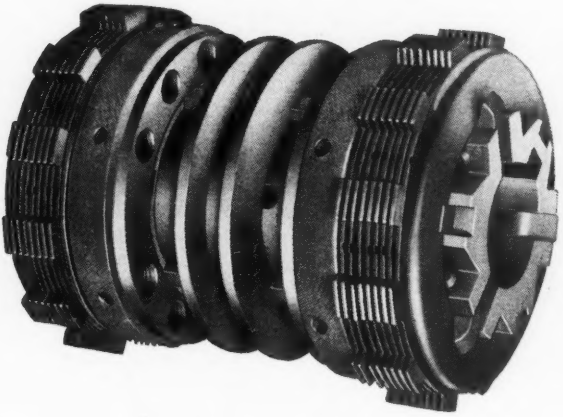
MERCURY, also known as quicksilver, will dissolve many metals and can be combined with them to form alloys which are known as amalgams. This action is made use of by industry for the separation of metals, and, in many cases, the amalgams have found application in various trades and professions. The most common metals which combine with mercury to form amalgams that are useful to the industries are tin, copper, cadmium, bismuth, silver and gold. Tin amalgam is used for silvering mirrors, silver and gold amalgams are used for silvering and gilding, zinc and tin amalgams are used in electrical machinery, while copper and cadmium amalgams are used by the dental profession. Some of the amalgams are used as metal cements, as they are plastic when formed, but harden after a short interval of time. The process of amalgamation is used to separate some metals from their ores.

Some amalgams are formed by direct contact of the metal with the mercury, while others are formed by placing the metal and mercury together in dilute acid. An interesting application of amalgamation by direct contact is the process of unsoldering iron parts which are so located that heat cannot be applied. The application is made either by building a pool or basin around the joint and filling it with mercury, or by repeatedly pouring the mercury over the joint. The solder, which is an alloy of tin and lead, both of which amalgamate, will be dissolved while the iron, which does not amalgamate by direct contact, will remain unaffected and can be re-soldered without difficulty.

## Power Speed Reducers

(*Continued from page* 13)

meter, with 6½ inches of square thread, driving a bronze or cast iron worm gear that is 15 3/16 in. diameter by 1½ in. thick. The center of the gear is bored to 7 in. diameter, to take a barrel that is 7 inches long, which contains a hexagon opening for the driving nut. The barrel carries a flange that is both riveted and electric welded to the gear. The nut is of bronze, is also 7 inches long, and contains a square thread to fit the draw bolt. Only two men are required to set up and operate this equipment, whereas from four to six men were required when using the old-type equipment.



# Now a Complete Line

BY the time you read this, the full line of Twin Disc C. C. machine tool clutches will be in production, and we shall be able to fill your orders for clutches with effective diameters as follows:

2", 2½", 3", 3½", 4", 4½",
5", 5½", 6", 7" and 9"

C. C. clutches are available both in dry plate type, with compressed asbestos drive plates—and in oil sprayed clutches, with alternate bronze and steel plates. The same compact design is used in both types, with the entire operating mechanism in the hub. Write for engineering data.

## TWIN DISC CLUTCH COMPANY

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# Preventing Man and Machine Idleness

-By J. J. BERLINER, B.C.S.
*Senior Member of the National Accounting Systems*

HOW much waste does the lost time of both men and machines in your plant represent? Can you answer this question off-hand? Take a trip through your plant and try to estimate what this apparent insignificant phase of your plant's workings amounts to in dollars and cents. The management of one company realized what this idleness amounted to and organized, through their employment, ways and means to reduce it to a minimum. Their efforts have been successful and I will outline the manner of operation.

The first step consisted in laying out a program, as follows:

1. Survey of present conditions.
2. Report of findings.
3. Recommendation for action and plan for organization.
4. Organization.
5. Operation.
6. Report of results.

The production manager appointed a man who had been trained along mechanical and scientific management lines to carry out this plan; he was added to the personnel of the employment department under the supervision of the employment manager. His office was to be "Balance of labor and production clerk." He was instructed to spend at least one month, or more if necessary, on his survey of present conditions, and as much time as necessary to obtain results on the balance of the plan.

**1. Survey of Present Conditions**

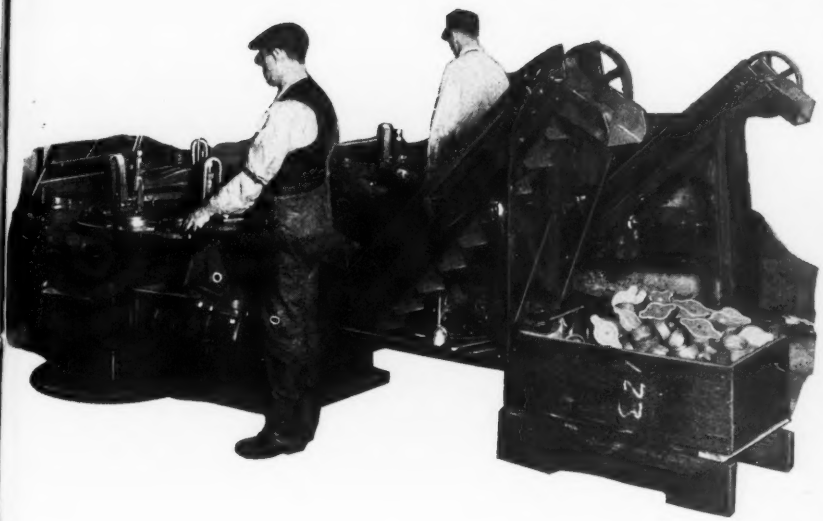
Every department of the production office was studied in detail as to its management, operation and relation to other departments, with special emphasis on the control and despatch division. After mastering this, shop conditions were studied, foremen and workmen were interviewed for their opinions as to present conditions and were asked for suggestions how they could be improved.

**2. Report of Findings**

It was found that there are four main causes of idleness of both machines and men. These were again subdivided as to more definite causes as follows:

A machine would sometimes stay idle for days and then again for weeks before it would be put into operation. There was no way of checking back to see if this machine could help out some other machine of the same kind that was overburdened with work. Machine breakdowns were not closely checked to see that the machine was placed in operation as soon as possible. If it was for "man-cause," there were no substitutes or understudies available to keep the machine running. If it was for tool troubles, there were no means of determining the nature of the trouble, nor any standard remedy. If it was for material trouble, there were no standard remedies.

Although the plant has been operated under scientific principles and had reached a relatively high standard of efficiency, still careful investigation disclosed that there were sev-



# 18 per minute from *each machine!*

THE bases of a world-famed shock absorber are ground semi-automatically on the two special No. 86-30" Gardner Grinders illustrated here.

Each machine is equipped with a special rotary-type work carrier which brings the work into contact with the grinding member, the operator being required only to place the castings into loading position. After grinding, they drop off by gravity into the conveyors shown.

The bases are drop forgings, and they are cleaned up to get a commercially flat seat from which all subsequent operations are gauged.

PRODUCTION: 18 pieces per minute.

GARDNER
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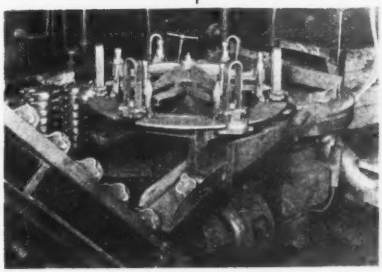
DISC GRINDERS
*High Production—Less Labor*



*GARDNER GRINDERS are producing at equally high rates, in all branches of the metal-working industry—*
ASK FOR DESCRIPTIVE BULLETINS!

GARDNER MACHINE COMPANY
*Specialists in Grinding Equipment*
428 East Gardner Street Beloit, Wisconsin, U. S. A.

**RED TAG REPORT** Sheet No. 1

| Machine No. | Machines in Group | Number of Red Tags | Number of Regular jobs | Date of First job | Date of Last job |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Date Issued .....

Date Received .....

Signed ..... Posted by .....

Despatch Div.

Fig. 1—Monthly Red Tag Report—8 x 11 inches. Work Behind Schedule.

eral small wastes of productive time which, considered cumulatively by the method hereinafter described, were surprising as to their amount and frequency. If a man received an idle time card he might roam about his department for a long period before he would again receive a job, and in some cases he was found roaming about the factory. There was no standard procedure for transfering an idle man to other work where he could produce according to his ability. The despatch department made an effort to place the man on other work, but not knowing what else the man could do, these efforts were of little or no avail.

A machine or group of machines might be chronically overburdened or might be excessively idle, yet this would not be noticed by the production manager or his supporters, due to the fact that there was no chart or other means of giving a graphic condition of burden or idleness, therefore congested points would not be relieved and red tags (work behind schedule) would pile up. Idle machines would not be given a chance to relieve this congestion. The amount of work behind schedule was reported in a lump total, so no one could determine exactly what parts were held up, or on what operation, or for what cause. There was no absolute method of proving by facts why or when new employees were needed, or for what machines they were required.

### 3. Recommendation For Action and Plan of Organization

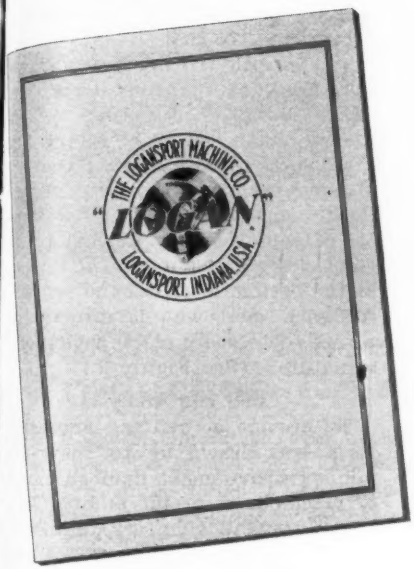
It was recommended that an idle machine board be built of sufficient size to accommodate 24 sheets of graph paper (11½x17¼ inches), to finish both sides of this board so that the graphs of last month could be kept up for reference, and that a platform be constructed so that the poster could reach all parts of the board.

The graphs were prepared as follows:

**A.** Graph sheets were purchased, size 11½ x 17¼ inches.

**B.** At the top of each sheet was placed the name of the month, sheet

# JUST OFF THE PRESS!

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It contains 64 pages of useful information, sectional drawings, with complete engineering dimensions, and describes many improvements on the various LOGAN Air Operated Devices.

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number, and above each square the number of each work day of the month.

**C.** On the left hand margin was placed: (a) department name (signified by symbol as A. F., Full Automatic); (b) machine number and location symbol; (c) one line skipped between machine groups in a single machine class, and three lines between different machine group classes; (d) machine classes arranged in alphabetical order.

**D.** Information as to machine location and groupings was procured from the machine and material location book, which is kept up-to-date by the tool and operation department.

**E.** New sheets made every month.

**F.** Sheets ready to be drawn off the board to be placed in a suitable book in numerical and monthly order for future reference.

### Machine Burden

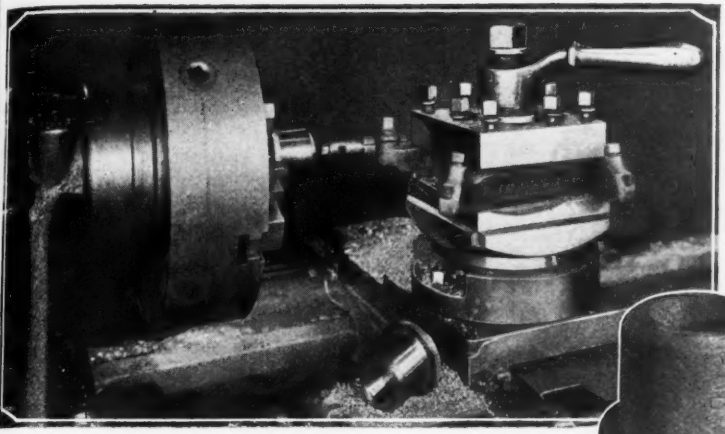
A form size 8x11 inches was printed and called the "Red Tag Report," this form ruled and provided with spaces for machine's number and symbol, number of red tags (work behind schedule), number of regular jobs, date of first job, and date of last job. (See Figure 1). Each month these reports are prepared by the employment department as follows: Using duplicator ribbon, number each sheet from one up, place in column for machine number and symbol, the number of symbol of each leader machine in each group to be arranged as on the idle machine board. A sufficient number is duplicated to last one month. These forms are delivered to the despatch department, which will deliver to the employment department not later than 9 a. m. the following morning a complete report of the jobs that are available in each department.

### Idle Machine Tickets

A form was devised in duplicate to include all the causes for machine idleness as mentioned in a preceding paragraph, so that it is necessary only to check the cause for idleness that fits each individual case. This ticket is called the "Idle Machine Record," and space is reserved for time clock records so that the lapse of time shall be recorded. In upper right hand corner, space is allowed for machine number and symbol and elapse of time in hours and tenths; at the bottom is placed the procedure for each man who is directly concerned, with space at the right for his signature. (See Figure 2.)

### Red Tag Analysis

To provide a "red tag analysis" a form was drawn up to show sheet number, department number, number of machines in group, number of red tags, drawing numbers, number of parts, operation number, lot numbers, number of lots and their dates. This analysis is drawn from the despatch cage each week to give a synopsis of the amount of work behind schedule and the exact stage of completion; that is, where it is and how near completion. These analyses are given to the production manager, his assistant, the factory superintendent, chief inspector, and the chief stock chaser, as a guide where to direct their most earnest effort. A comparison summary of this report is made each week by giving the total of red tags charged against each department, opposite these totals the totals of two months ago, and opposite these the percentage gained or lost, shown by a + or — sign. A grand total of all red tags in the factory is shown and its percentage



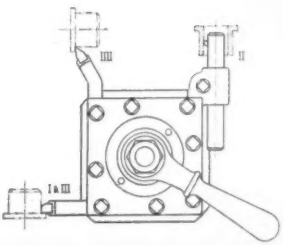
# McCrosky Turret Cuts Production Time 40%

THE JOB—Machining all over bronze bushings. A four-way McCrosky Turret is bolted to bolt circle of a modern engine lathe. At one set-up three different tools required are mounted in the turret.

The line drawing shows the required order of operations: 1—Rough-turn diameter of sleeve; 2—Rough and finish bore; 3—Finish-turn diameter; 4—Face inside of flange true. The McCrosky Turret enables the operator to swing each tool into position without stopping his lathe. The patented, positive indexing mechanism takes care of the extreme accuracy required.

Customer's Verdict: "Our McCrosky Turret has enabled us to rig up an engine lathe to give production almost equal to a special turret lathe set-up. It has saved us 40% in production time on this job."

Bulletin No. 11-C tells the whole McCrosky Turret story. Send for a copy.




## McCrosky Tool Corporation

MEADVILLE, PENNSYLVANIA

*Branches in* Cleveland, Detroit, Chicago, Toronto

| | | | |
|---|---|---|---|
| Returned<br>Issued | | Machine Symbol<br>Located In Dept. | |
| Idle machine record | | Elapsed Time | Hours Tenths |
| MACHINE | | TOOLS | |
| Break-down | | Fixture lacking | |
| Under repair | | Fixture defective | |
| Power shut-offs | | Supplies lacking | |
| Belt breakage | | Supplies defective | |
| | | Tool release lacking | |
| MAN | | MATERIALS | |
| Absent | | Not up to machine | |
| No operator assigned | | Urgent on preceding machine | |
| Reg. Opr. on other work | | Ahead of schedule | |
| | | Up but no orders | |
| | | Up but no inst. card | |
| DISPATCH CLERK—Issue, Mark Cause, Send White to M.W., Post Yellow. | | | Issued By |
| MASTER WORKMAN—Verify and Return to Dispatch Clerk | | | Verified By |
| DISPATCH CLERK—Compare and when agreed send to Emp. Dept. to be Posted. | | | Posted By |

Fig. 2—Idle Machine Ticket.

gained or lost shown by the + or — sign. This summary is a key, to direct attention to the departments that are lagging behind.

### Idle Man Ticket

For this purpose a form is used which is constructed similar to the idle machine record but is of different color, with instructions on the reverse side as to the way to use it, why it is given, and the time limit of a single idle time ticket (See Figures 3 and 4).

### Idle Man Records

On graph sheets as used on the idle machine board, a graph curve is constructed to show the amounts of idle time separated to the four main reasons; tools, machine, materials, instructions. Separate curves are co structed for each department. T time is calculated by the week, summary made and the totals adde to the graphs. This gives a graph condition of the idleness, the depar ment in which it is most pronounce and the cause.

### Processes

A questionnaire is used which give the employee's name, departmen number, address, telephone numbe married or single, nationality whether or not he is an Americ citizen, different languages he speak educational record, the number of op erations he is capable of performin and an affidavit from his foreman a

verification of all the facts. All operations used in this factory are listed with a space for the length of time worked as follows:

| | Yr. | Mo. |
|---|---|---|
| Engine Lathe Opr. | | |
| J. & L. Opr. | | |
| Lo-swing Opr. | | |
| Hd. Screw Opr. | | |

In a Rand file, cards giving man's experience are recorded in department numerical order. These operations are also cataloged in a separate file under operations, where all employees who can operate a J. & L. will be catalogued under head of "J. & L.," all men who can operate an engine lathe under head of "Engine Lathe," and so on. If it is necessary to shift a man who becomes idle to another job, we know from the Rand file where we can use him to advantage, or if we need a J. & L. operator on quick notice we can refer to our cataloged operation file and find an available man. By this method we always work within our force and hire in at the bottom only semi-skilled or unskilled labor, thus reducing our skilled labor turnover to a minimum. In times of work fluxuation in various departments we can shift surplus labor to or from departments with a greater degree of accuracy and discretion.

### 4. Organization

The plan for organization was approved by the production manager and carried out as outlined above.

### 5. Operation

**A.** An idle machine board was constructed as outlined above.

**B.** Idle machine tickets were made up, printed in duplicate, alternating white and yellow.

**C.** The despatch department is instructed to issue an idle machine ticket when a machine goes idle, mark cause of idleness, send white copy to the department foreman, post yellow in machine rack, instruct the foreman or clerk to verify as to machine number and cause for idleness, and return to despatch department. The latter will then send to employment department when agreed as to cause of idleness. The employment department will post this idleness on the idle machine board as follows: (a) Idleness is posted under date headings, and opposite corresponding machine numbers. (b) Idleness is shown by color as follows:

| | |
|---|---|
| Labor | Red |
| Material | Black |
| Absence | Yellow |
| Tools | Blue |
| Machine | Green |

(c) On completion of posting, the tickets are placed on file for a period of two months.

**D.** Construct and deliver to the despatch department the red tag report blanks as outlined above. Instruct despatch department to draw off a report each work day that will contain such information as the number of red tags, number of regular jobs, with date of the first and last job of each machine group as outlined in the report. These reports to be delivered to the employment department not later than 9 a. m. the following morning. The idle machine board poster will record in the respective square opposite the department number and under the correct date, the number of red tags in the right-hand small square and in small numbers the number of regular jobs above the left-hand small square with the two dates in the left-hand small square. After posting, the report is turned over to the idle machine board supervisor who makes the necessary

| Returned | | Hours | Tenths |
|---|---|---|---|
| Issued | | Rate | Amount |

CHG.
IDLE MAN TO F. No. 115

| Machine Symbol | | Man's Name | | Man's No. |
|---|---|---|---|---|

| TOOLS | | MATERIALS |
|---|---|---|
| Lacking, or missing | | Lot incomplete |
| Defective, or faulty | | Tags missing |
| Delayed for grinding | | Not up to machine |
| Delayed for supplies | | |
| **MACHINE** | | **INSTRUCTIONS** |
| Breakdown | | Lacking, or missing |
| Repairman working on | | Defective, or incomplete |
| Belt troubles | | Error of clerk or man |
| Power shut-offs | | Inspection troubles |
| Setting up machine | | Job cards missing |

REMARKS:

INSTRUCTIONS—Check carefully item causing delay.

Use "Remarks" only when reason not covered by any of above.

| | |
|---|---|
| Foreman | |
| Dispatch Clerk | |
| Rat. Div. | |
| | |
| | |

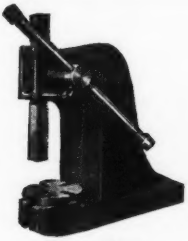
Fig. 3—Idle Man Ticket.

notes, then it is to be filed for a period of two months.

**E.** When necessary, report to the production manager all doubtful cases so that corrective action can be taken.

**F.** Idle man tickets are to be handled as outlined for idle machine tickets, and delivered to the employment department not later than 9 a. m. the following day. The time limit of an idle man ticket is one hour and if at the end of that time the man is idle, the despatch department will send the man to the employment department, which will consult the operation file, and send him to a department where the need for men permits and where he will produce according to his ability. The despatch department will be notified by a temporary transfer where the man is to be sent, and when production conditions require the man's return the despatch department will be notified by a temporary transfer where the man is to be sent, and when production conditions require

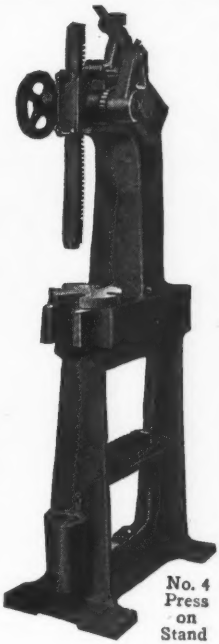
No. 1 Press



No. 2 Press

No. 3 Press

# SHELDON Arbor Presses



No. 4 Press on Stand

DESCRIPTION—Sheldon Arbor Press frames are made of semi-steel, the metal being properly distributed, giving a light and exceptionally strong casting. Rams and pinions are made of alloy steel, heat-treated. Large stub tooth is used. Rams are square, carefully fitted, insuring proper alignment.

Nos. 1 and 2 presses are furnished only with plain levers. No. 3 presses are furnished either plain or ratchet levers. No. 4 presses only with compound levers.

Floor Stands can be furnished for our No. 3 and No. 4 presses. They are made of semi-steel, are well ribbed and of heavy construction. They are provided with removable shelves and wood pots for catching mandrels, tools, etc.

— SPECIFICATIONS AND PRICES —

| *Ask for Complete Catalogue* | No. 1 Press | No. 2 Press | No. 3P Press | No. 3R Press | No. 4 Press | No. 3 Floor Stand | No. 4 Floor Stand |
|---|---|---|---|---|---|---|---|
| Largest dia. will take. | 7″ | 12″ | 16″ | 16″ | 20″ | | |
| Largest dia. mandrel.. | 1″ | 1⅝″ | 2⅛″ | 2½″ | 3″ | | |
| Height over plate.... | 4½″ | 8½″ | 14″ | 14″ | 18¼″ | | |
| Max. height will take. | 5″ | 9⅛″ | 15″ | 15″ | 19½″ | | |
| Size of ram (square). | ⅞″ | 1⅛″ | 1½″ | 1½″ | 1½″ | | |
| Length of ram..... | 7¾″ | 13½″ | 21″ | 21″ | 26″ | | |
| Movement of ram.... | 5″ | 9¼″ | 15″ | 15″ | 20″ | | |
| Leverage..... | 25 to 1 | 35 to 1 | 48 to 1 | 72 to 1 | 100 to 1 | | |
| Pressure on ram (tons) | ¾ | 2 | 5 | 7½ | 10 | | |
| Height..... | 9½″ | 17″ | 26″ | 26″ | 33½″ | 35″ | 30″ |
| Dimensions of base... | 4″x10″ | 6¼″x17″ | 8″x20″ | 8″x20″ | 8″x24″ | 14″x22″ | 14″x25″ |
| Net weight..... | 19 lbs. | 75 lbs | 150 lbs. | 215 lbs. | 320 lbs. | 145 lbs. | 185 lbs. |
| Weight crated..... | 20 lbs. | 85 lbs. | 170 lbs. | 240 lbs. | 360 lbs. | 150 lbs. | 195 lbs. |
| Price, F.O.B. Chicago. | $10.00 | $20.00 | $30.00 | $40.00 | $75.00 | $20.00 | $30.00 |

No. 3-R Press

## SHELDON MACHINE CO.

3251 COTTAGE GROVE AVE. CHICAGO, ILLINOIS

the man's return the despatch department will notify his temporary foreman, who will send him back to his regular department. Idle man records are to be maintained as outlined in a preceding paragraph. Reports are

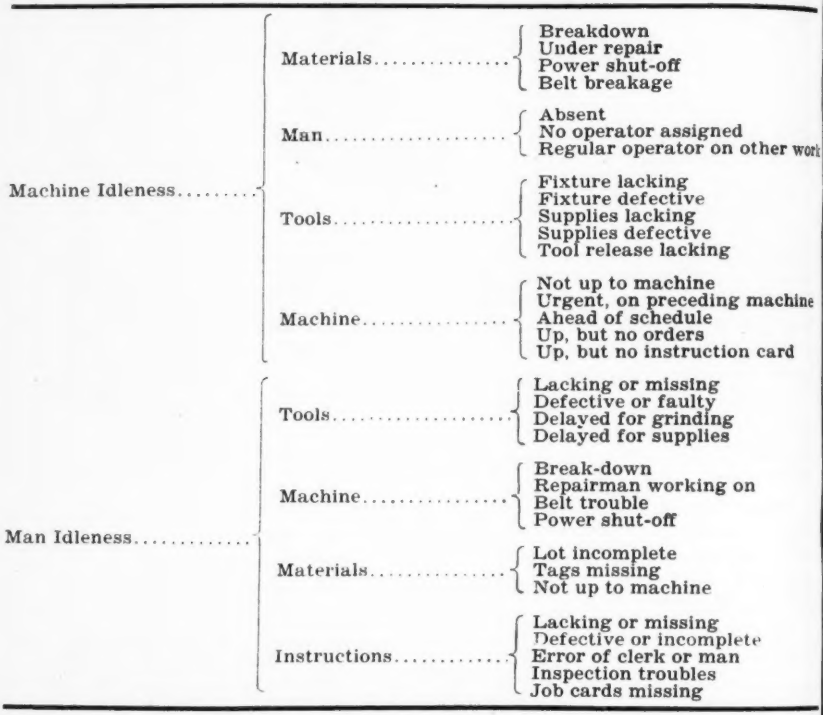



Fig. 4—Causes of Man and Machine Idleness.

to be made to the production manager if there are any doubtful cases, or if any department has an exorbitant amount of idle man-time charged up to it.

G. When it becomes necessary to change the sheets on the idle machine board, the old sheets are to be placed in a suitable book with regard to months and sheet numbers.

### 6. Report of Results

The first three months that this system was in operation the idleness decreased 50 per cent, and has been steadily decreasing every month. An absolute check on red tags (work behind schedule) is made possible. Red tags are kept to a minimum, as it is easy to plan a re-routing of the flow of work to the machines which are idle for lack of work or are not heavily burdened. It keeps the production manager posted on the condition of the factory at all times, and shows the employment department where the need for men is the greatest. See Figure 5 plotted for a typical month.

To show a graphic condition of the work behind schedule in the entire factory we compiled all the data we

(*Continued on page* 112)

# Machining Parts for Wright "Whirlwind" Engines, V

*By* PHILIP WINTER

THE crankshaft for the Wright "Whirlwind" Aviation Engine is a two-piece, single throw, counter-balanced assembly, machined from nickel-steel forgings. The front section of the shaft consists of the shaft proper, the front crankcheek with its counterweight, and the crankpin. The rear section consists of the rear crankcheek with its counterweight and the rear main bearing hub.

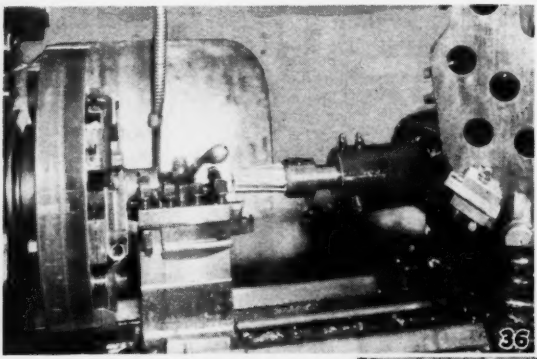
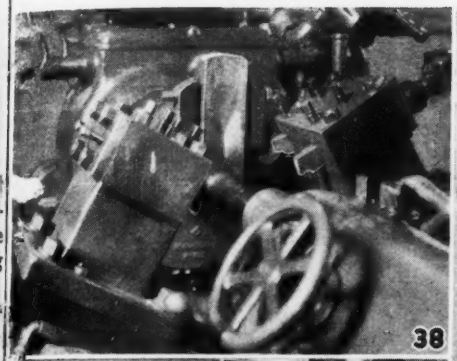


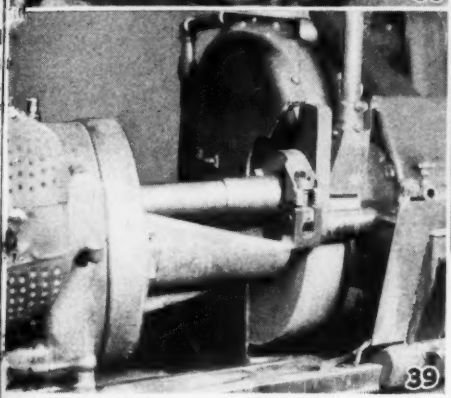
Fig. 36—Turning, boring, and facing the rear section of the crankshaft. Fig. 37—Milling V-slots in crankshaft rear sections, using a Rigidmil and two 60-degree angle cutters.

The shaft proper and the crankpin are bored throughout their length for lightness except at the rear of the crankpin, where a heavy circular rib is provided to prevent distortion when the rear section of the shaft is clamped to the crankpin. The crankpin is provided with a straight groove to receive the clamping cap screw. The propeller end of the crankshaft is splined to receive the thrust bearing nut and the nut which holds the front bearing in place when assembled.

The rear crankshaft is bored at one end to receive the crankpin, the operation being performed in the turret lathe shown in Fig. 36. The rough boring of the hub, turning of the hub, and the facing of the hub and crankcheek take place simultaneously, the rough boring and turning operation being performed with the single point tools shown projecting from the turret at the right of the illustration. The facing tools are held in the turret toolholder mounted on the lathe cross slide. The finish boring operation is performed with the

(*Continued on page* 69)



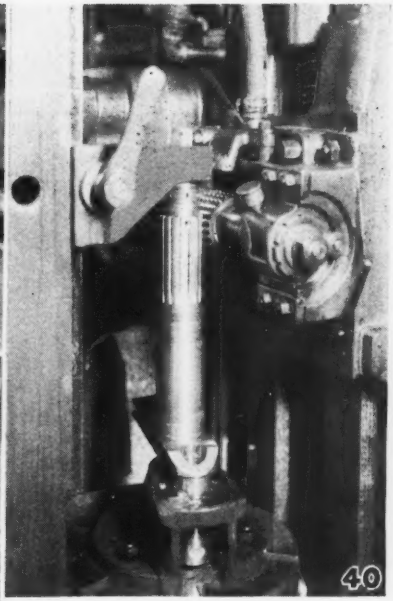




Fig. 38—Turning and facing the front crankshaft section in an automatic lathe. Fig. 39—The crankshaft pins are finished to size in this Norton grinder. Fig. 40—Splining the rear end of the crankshaft for the propeller hub.

## Machining Wright Engine Parts

(*Continued from page* 64)

Eclipse multi-diameter cutter shown in position in the illustration. Approximately .012 in. is left in the hub for grinding.

The illustration Fig. 37 shows the operation of milling V-slots in two crankshaft rear sections, for which a "Rigidmil" and two 60-degree angle cutters are used. The sections are bolted to an angle plate fixture, locating by the crankpin holes. The object of this operation is to lessen the weight by the removal of stock where it is of no value, and improve the appearance of the engine. The machine works semi-automatically, feeding at rapid traverse to cutting position, feeding at cutting speed until the cut is through, and then reversing at rapid traverse speed to loading position, at which point the table stops. After the machine has been set up, the operator is required only to change the pieces.

The crankpin, which is a part of the front section, is rough turned and faced to length in the LeBlond automatic lathe shown in Fig. 38, the front crankcheek being faced in the same operation. The two tools in the rear toolblock perform the facing operations while the turning operation is being performed by tools held in

the front toolblock. The piece is swung between centers, the crankcheek locating between two jaws which are integral with the driving head. Setscrews in the jaws provide for locking the crankcheek rigidly in position. Approximately .030 in. is left to be removed in the grinding operation.

The crankshaft pins are finished by grinding to size in the Norton cylindrical grinding machine shown in operation in Fig. 39. The piece is held by clamping in a fixture, aided by the tailstock center. The pin is finished to drawing size within ± .001 inch.

The machine shown in Fig. 40 is a hobbing machine, set up to spline the rear end of the crankshaft for the propeller hub. The shaft is located and held by a screw-center at the upper end, the lower end being clamped in a fixture in which the necessary amount of "throw" is provided for. Sixteen splines, five inches long, are cut in the shaft, the width of each spline being held to a limit of ± .0005 in. A shaft is splined, complete, in forty-five minutes, which makes it possible for one operator to take care of several machines.

Each shaft used in a Wright airplane engine must pass a rigid inspection to make sure that the dimensions come within the required limits, that the workmanship is perfect, that the shaft is straight, and that it is perfectly balanced. A shaft in process of inspection for straightness is shown in Fig. 41, where the variety of precision gages and tools required for



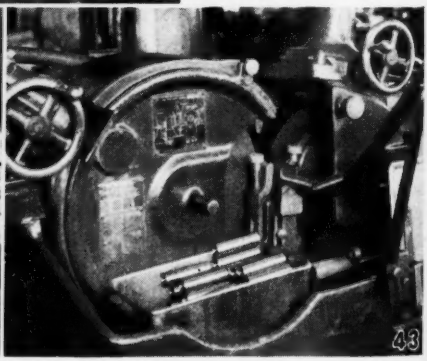



Fig. 41—Each shaft is subjected to a rigid inspection before it is assembled to the engine. Fig. 42—The cams are ground to shape and size within .002 inch. Fig. 43—Wristpins are finished in the Centerless grinder.

# Here's what HOCUT will do for you

HOCUT keeps the work and tool cooler—increases tool life—and gives more pieces per tool grind. Heavier cuts and higher speeds are possible. Production is increased.

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Fig. 44—View of one side of the motor assembly department.

inspection can be seen on the inspector's table.

The valves on the "Whirlwind" engine are actuated by a cam which consists of a hardened steel ring carrying a double row of lobes and an internal gear. The cam ring is rivetted to an aluminum hub. The cam is finished to the shape and size desired by grinding in the machine shown in Fig. 42, where a piece can be seen in process. The mechanism by which the work-spindle is actuated is so constructed that it feeds to and from the wheel with a reciprocating motion, the action being governed by a master cam and roller in the headstock mechanism. With this equipment the cam is finished to specifications within .002 inch.

The wristpins are of steel, cut to length, hardened, and finished to size by grinding in the centerless grinding machine shown in Fig. 43. The pins are fed to the machine by means of a trough, into which they are placed so that they are carried to the wheels by their own weight. The action of the grinding wheels feeds them through and finishes them at the same time. A total of .015 in. of stock is removed, the pins being passed through the machine five times. A net production of from 75 to 200 pins per hour is obtained, and the diameter of the pins is held to a limit of .0002 inch.

Figure 44 shows one side of the final assembly department, which is laid out so that the motors travel down one side of the room, each starting as a crankcase in position on a motor stand and finishing at the opposite end of the room as a complete motor. The motor stands are guided by means of a track set into the floor, as shown. The benches upon which the small parts are finished and assembled into minor assemblies are arranged crosswise of the room, at right angles to the motor assembly line, which makes it possible for the material to start at one side of the room and finish at the other side at the point where it is to be assembled to the motor. When the motor leaves this department, it is ready for testing.

---

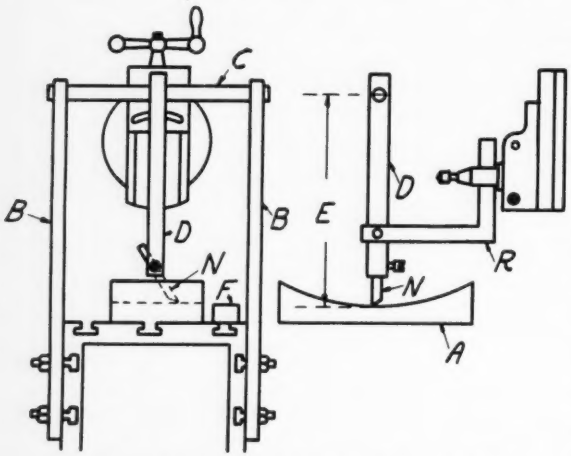
# Ideas From Readers

*This department is a clearing house for ideas. If there is a "kink" or short-cut in use in your shop, send in a description of it. We will pay $5 for each one published.*

## Machining a Radius With the Shaper

*By* CHARLES KUGLER

ONE of the jobs that came into our shop recently consisted of machining a 12-inch radius in the surface of each of a number of cast iron blocks. As there was no lathe available large enough to cut a radius of this size, we decided to machine the blocks in the shaper, using the attachment illustrated in the drawing.




Attachment for Machining a Radius with the Shaper

The work is indicated at **A.** The frame of the attachment consists of the two vertical supports **BB** and the horizontal shaft **C**, the side pieces being bolted to the sides of the shaper table, as shown. Suspended from shaft **C** is the bar **D,** which carries the tool **N;** the combined length of the bar from the center of the shaft hole to the end of the tool, indicated as **E,** being the dimension of the radius. In order to simplify the task of setting or re-setting the tool, the block **F,** the top surface of which is the required distance from the center of shaft **C,** is clamped to the machine table. The necessary connection between the tool and the shaper-ram is provided by the angular bar **R,** which is clamped in the tool post and to which the bar **D** is bolted. By using this attachment a radius can be machined as easily as though it were a flat surface.

## A Flexible Punch Shank

*By* PAUL A. BARD

THE punch holders used by one large maker of metal stampings were formerly made with shanks which were cast integral or solid with the punch holders. In course of time, due to the wide range of work going through the shop and the wide variety of punch presses in use, he decided to change from cast punch holder shanks to machine steel shanks.

These steel shanks are screwed into the punch holder and it becomes a simple matter, of course, to remove the shank and replace it with one that is longer or of a smaller or larger diameter, according to the requirements of the press. Machine steel shanks, however, work loose due to vibration and side pressure during forming, piercing or blanking operations, and it became necessary in consequence to dowel the shanks in position, so that they could not work loose.

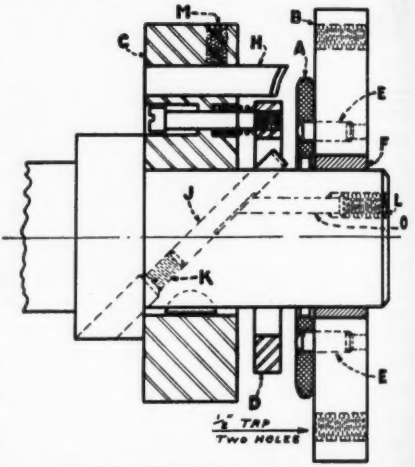
The use of dowel pins, however, had the objection that once they were put in, they were difficult to take out, thus interfering with the flexibility which it had been aimed to obtain by the use of steel screw shanks. This company now uses socket head set screws instead of dowel pins. These socket head set screws can be tightened, of course, with a hexagonal wrench. There are no protruding heads to get in the way and removing the set screw and shank becomes a very simple matter. These shanks cannot turn or work loose, yet they may be removed quickly and easily.

## A Good Combination Tool

*By* H. L. Wheeler

THE tool described and illustrated in this article was designed to turn the ¼-in. radius and chamfer the bore on the sides of the sprocket shown as **A** in the drawing, performing the two operations simultaneously. The work is held by the fixture **B**, which consists of a flat plate steel ¾x6x6-in., bolted to the faceplate of the machine with two ½-in. cap screws. In the plate are two locating pins **EE**, which support and drive the work. The plate is also fitted with a guide bushing **F**, which is a running fit for the pilot on the toolholder.

The shank and pilot of the tool are in one piece and serve to carry the piece **C**, in which is mounted the tool **H**. The piece **C** is both pressed on and keyed in position to prevent it from turning. The radius tool **H** is held in place by the headless setscrew




Tool for Chamfering and Forming Simultaneously.

**M**. The chamfering operation is performed by the tool **J**, which is fitted to a hole that is drilled through the bar at a 45-degree angle. This tool is held in position by the adjusting screw **K**, a clearance hole being provided into which a screwdriver can be inserted to turn the screw. It is held from turning by the key **O**, locked in position by the screw **L**.

While the tools are cutting, the piece is held in position by the pressure ring **D**, which is attached to the toolblock **C** by three filister head screws. The pressure ring is controlled by three springs which fit into corresponding counterbored holes in the toolblock. As the pressure ring is held away from the toolblock as

far as the heads of the screws will allow, the ring comes in contact with the work before the tools are close enough to start cutting, thus providing pressure to hold the workpiece firmly against the face of the fixture **B**. The cutting oil which flows over the tools while in operation also serves to lubricate the contacting faces of the work and the pressure ring. After one side of the workpiece has been machined, the tool is withdrawn and the piece is reversed so that the reverse side may be machined. The tool can be used in either a hand turret lathe or engine lathe. The work is easily removed by hand, the two locating pins **EE** being a free fit in the holes.

## Transparent Templets Assist Drafting Room

*By* C. G. Crowley

AFTER the details of a die or forming job have been laid out, the final job consists in choosing a die set suitable for the job. The set selected must allow sufficient room for the die, and the punchholder and dieholder must have sufficient thickness for the die, which also means sufficient depth or thickness to provide for the necessary strength. The type of shank to be used must also be determined; whether of the solid cast type, and if so, of what diameter and length, or whether of the steel inserted type or to consist of a swivel adapter. The sum total is that in many cases the task of drawing up a design for the die set, having the patterns made, and having the castings machined brings the cost of the die set up materially, as both drafting room and tool room time is included in the expense.

Danly transparent templet in use, showing ease with which a die set may be selected.

A number of the larger manufacturing plants have found a way to avoid a large part of this detail and expense by using transparent templets as shown in the accompanying illustration. When using the templets, all that is necessary in order to determine the type and size of die set required is to place the templet over the drawing of the die or, where the die is made, upon the die itself. It is then a very simple matter to decide upon the type and size of die required.

These transparent templets are now being furnished to the larger users of die sets by manufacturers of standard die sets such as Danly Machine Specialties of Chicago. A complete set consists of forty-one templets, the larger ones being made in halves. In some cases, several different die sets are indicated on one templet.

# SIXTEEN FEATURES

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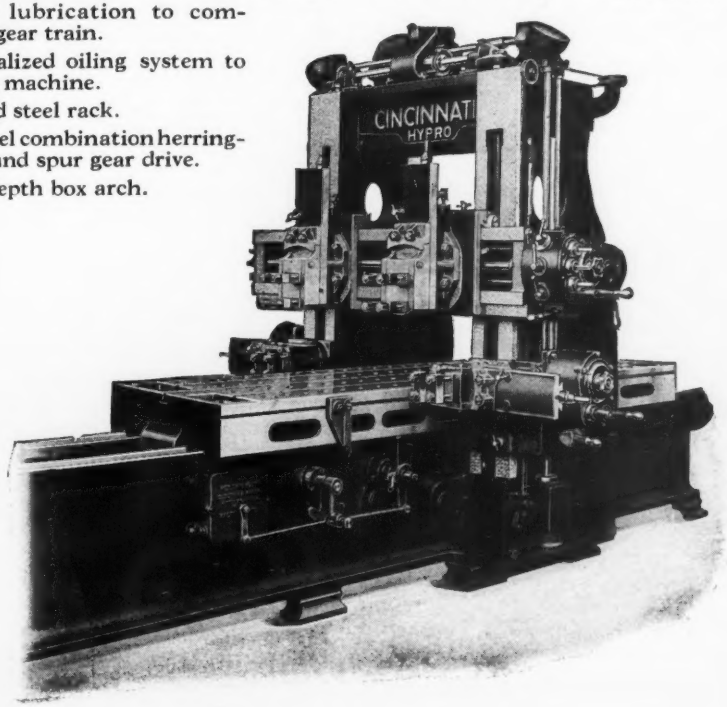
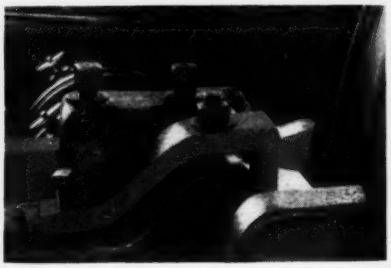


# A Tool-Clamp For the Wheel Lathe

*By* Jos. C. Coyle

IN machining the treads of car wheels at the Denver & Rio Grande shops in Denver, two forming tools are used for each wheel. The tread is roughed with a tool that is 16x3x2 in., the tool being held in position by two 1-in. setscrews. The finishing tool is a flat form tool, forged to shape. At the rear edge of this tool is a ½-in. tongue which is inserted into a slot in the toolblock, where it was formerly held by means of two ¾-in. bolts. As considerable time was lost in changing finishing tools, however, the special clamp



A Tool-Clamp for the Wheel Lathe

shown in the illustration was made. With this clamp the tool can be removed by loosening one nut.

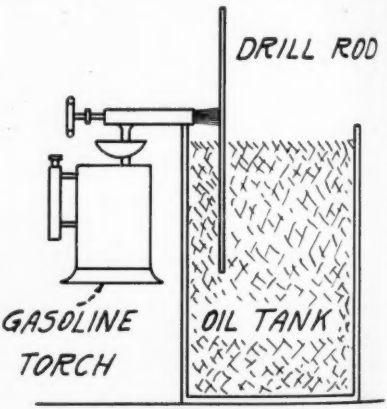
The clamp is made of an 18-in. length of 1x3-in. steel, bent at right angles at a point three inches from one end. The bar is bent to conform to the shape of the top of the machine frame and is drilled so that it can be held in place by a setscrew near the rear end and a bolt at the front, both of which are screwed into the frame. The straight 3-in. section extends downward and bears on the top of the tool, pressure being applied by means of the nut on the bolt.

To remove or change tools, it is only necessary to loosen this nut. The rear end of the forming tool sets ½-in. into the toolblock and bears against the head of the machine.

## Hardening Drill Rod

*By* CHARLES KUGLER

FINDING it necessary to harden a length of 3/16-in. drill rod, 12 inches long, several methods of performing this task were tried without success. The difficult part of the job lay in keeping the rod straight. We finally decided to try heating a small portion of the rod at a time, using a gasoline blow-torch, and found this method satisfactory. A tank was filled full of oil and the torch was held so that about two inches of the rod could be heated at a time, the heated portion being immediately quenched by lowering into the oil. While one section was cooling, the next section




Showing method of hardening drill rod.

was being heated. In this manner we were able to harden the entire rod without warping it. While this method would be too slow for production work, it is worth trying when one or two pieces are to be hardened.

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# Over the Editor's Desk

## *Organized War On Unemployment*

ACTION seems to be the order of the day as regards the unemployment problem. Finally recognized as both a local and a national calamity, and therefore of as much concern to the community and the nation as to the individual, the industrial organizations in a number of cities have organized to discover the fundamental reasons for unemployment and, as far as possible, develop ways and means to end this periodical disturbance to peace and prosperity.

The initial efforts of those who are engaged in the research upon which this investigation will be based have disclosed an almost total absence of information as to the real causes for lack of employment. In many cases, the reduction of working forces has been forced by a dropping off in orders which failed to come in as a result of some psychological condition in the minds of logical buyers. In other words, a vast percentage of the employers who reduce their outputs and, accordingly, their working forces, are governed more by apprehension as to how apprehensive the "other fellow" may be than they are by actual knowledge of the market for their products. This unwarranted and unnecessary caution can be eliminated by a fuller understanding of market possibilities and by a closer co-operation between manufacturers. It is to be hoped that the agencies which have undertaken the research work will continue to function until all the mysteries regarding markets, the labor-capacity of industry, the relation of wages to buying power, the bugaboo of "over-production," and other related factors are cleared up.

## *Vacation and Perspective*

THE time is approaching when all those who can will lay aside their tools, or close up their desks, and get as far away as possible from the tasks that have occupied their energies during the past year. To the employee whose task is finished with the end of each day, this respite from labor is an opportunity for recreation and play; to the executive upon whom rests the responsibility for results from a department or a plant, it is an opportunity to obtain something that is too little regarded —a view of the job in the perspective.

Too many of us are too close to the job to see it as it should be seen. We are too engrossed in the details of the every-day task to see the possibilities in our respective jobs and to obtain a correct idea of the relation of our individual functions to the organization as a whole.

To the executive who is thoroughly sold on his firm and his job, vacation gives relief from the details and affords an opportunity for mental readjustment. The result is that he returns full of new ideas and enthusiasm, not necessarily because he is rested, but because he has been able to get far enough away from the job so that he could see it in the perspective—as a part of the whole—and thus see opportunities in it that he had overlooked before.

# New Shop Equipment

## Bolender Gear Burnishers

The City Machine & Tool Works, East Third at June St., Dayton, Ohio, announces two additional models of its standard line of Bolender Gear Burnishers, making available at one source a complete range of machine tools for improving the bearing surfaces of gear teeth as they come from the gear cutting machines. In addition to this company's Model OO, which provided an air-equipped machine tool for burnishing gears while mounted with their center lines vertical, the Models O and No. 2 each has the additional features of a completely automatic burnishing cycle and greater range in capacity. Model O has capacity for gears from ¼ in. to 2¼ in. dia. by ½-in. face width, and Model No. 2 has capacity for gears from 1½ in. to 14 in. dia. by 2½ in. face width. Cluster-type gears can be efficiently handled on this machine. Larger sizes of gears can be handled on both of these machines by slight modifications in design.

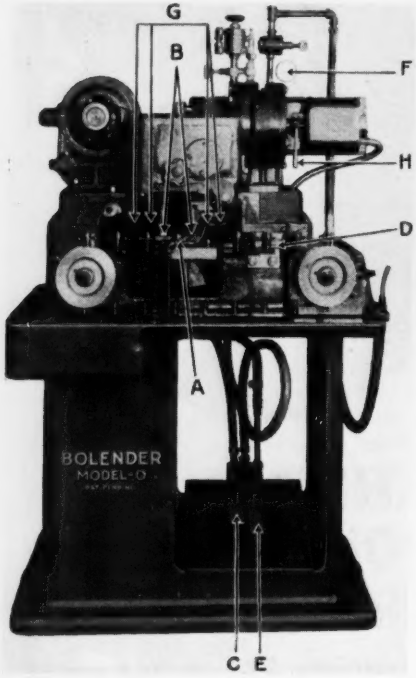



Fig. 1—Bolender Model O Gear Burnisher.

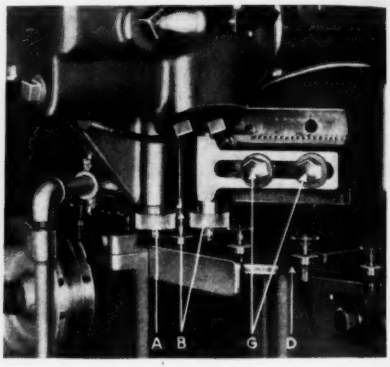
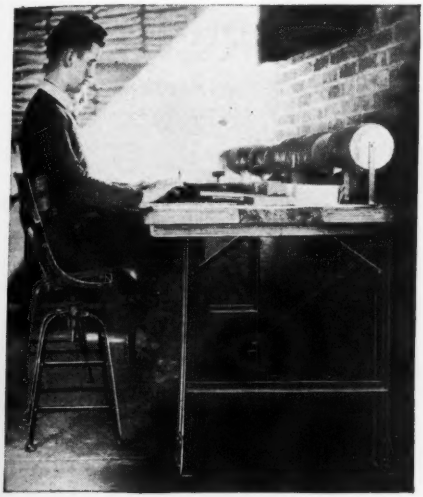



Fig. 2—Close-up view of the Burnishing Rolls, With Gear in Position.

A front view of the Model O Gear Burnisher is shown in Fig. 1, Fig. 2 showing a close-up view of the burnishing rolls with a gear in place between them. The belt conveyor used for handling the pieces is also shown. As many of the gears processed in this machine are of small size, the advantages of the mechanical loading device will be apparent. The burnishing mechanism consists of three hardened steel rolls, **A** and **B**. Roll **A**, in front, is located on a fixed center and is rotated by power. The two rolls **B**, which are at the rear, are mounted on spindles on a slide so that they may be



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withdrawn by pushing down pedal **C**. The action of withdrawing burnishers **B** also pulls forward the conveyor belt **D** on which the gears are carried to the burnishing rolls. With the gear in position, pedal **E** is depressed, tripping the air valve which applies air pressure behind the piston connected with the slide carrying burnishers **B**. The load thus placed on the gear rapidly runs it in to a good bearing. Provision is made for regulating the pressure by a valve with which the pressure may be cut down to the desired amount, as indicated on the gauge **F**. A micrometer stop at the rear of the slide provides for gauging and duplication.

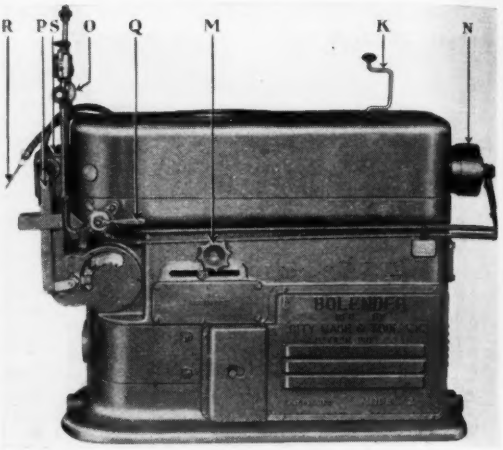


Fig. 3—Bolender No. 2 Gear Burnisher, for Larger Gears.

Provision is made for adjusting the position of the slide carrying the burnishers **B** in order to accommodate different sizes of gears, the slide being clamped by the nuts **G**.

To provide for burnishing both sides of the gear teeth, a mechanically-operated electrical control is provided which reverses the direction of rotation of the gear while the operation is

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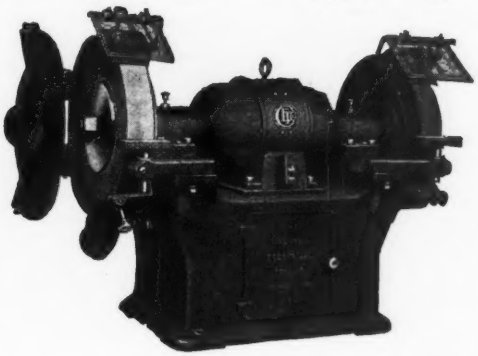

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in process. The machine is started by throwing switch **H** by hand, which starts the rotation of the burnisher **A**. After a specified number of revolutions, a mechanical tripping device throws a drum-type switch used in conjunction with a magnetic switch which reverses the direction of rotation.

The Model No. 2 machine is shown in Fig. 3, and in Fig. 4 is shown the details of the burnishing rolls with a gear in place. This machine is intended for work that is large enough to be handled readily, consequently an opening is provided in the cover through which the gears are dropped onto a mandrel of suitable form to fit the hole in the gear. Burnisher **I** is driven by power and the two burnishers **J** are loosely mounted on spindles carried by a slide. Adjustment of this slide for

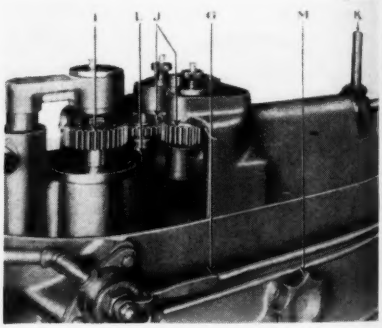



Fig. 4—Burnishing Rolls on No. 2 Machine, With Gear in Place.

center distance is accomplished by means of a crank **K**, which turns a screw on the piston rod, threaded into a nut carried by the slide. Vertical adjustment of the work is controlled by screw **L**, turned by knob **M**. The arrangement of the electric reversing mechanism is the same as on the Model O machine.

Among the exclusive features of these machines is the manner of locating the gears, which lie in a horizontal position with their center lines vertical so that no matter how large or how long the gear, there is no overhang or unevenness in pressure due to uneven weight distribution. Air, which is flexible and can be varied to suit requirements, is utilized for pressure against

the burnishers. A continuous, even pressure is, however, assured at all times. An air nozzle for cleaning purposes is indicated at **R**, and the oil reservoir is shown at **S**.

## B. & S. No. 701 American National Standard Screw Gage

The No. 701 American National Standard Screw Gage, which has been placed on the market by the Brown & Sharpe

**B. & S. No. 701 American National Standard Screw Gage.**

Mfg. Co., Providence, R. I., makes possible the immediate determination of screw thread sizes according to the American National (and U. S.) Screw Thread Standards. One side of the gage is graduated for the fine thread series and the other side for the coarse thread series.

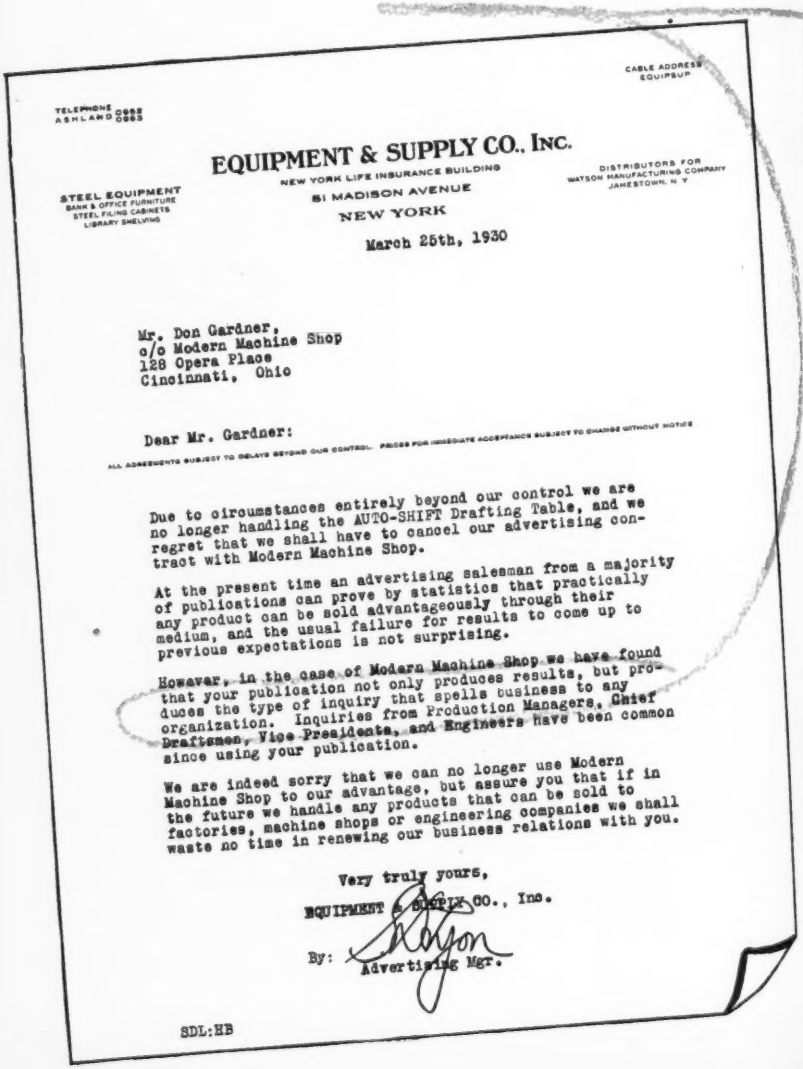
One outer edge of one side is graduated to eighths of an inch and may be used as a three-inch scale for measuring the lengths of screws. Slots at either end of the scale permit the heads of both round and flat-head screws to be set against a positive stop for measuring.

## Bellevue Electric Soldering Iron Heater

Users of soldering irons in places where gas is objectionable or is not available can now heat the irons in the "Bellevue" electric soldering iron heater, which has been developed by the Bellevue Industrial Furnace Company, 2973 Bellevue Avenue, Detroit, Michigan. This heater can also be used for annealing or hardening small parts. The furnace is 15½ in. wide, 13¾ in. high and 13¾ in. from front to back. The chamber is 5 in. deep, and the size of the opening is 4½ in. wide by 1⅝ in. high. The heating elements are the "Globar" Cartridge-Type, which can be

(*Continued on page* 96)

# "Produces the Type of Inquiry



TELEPHONE
ASHLAND 0085

CABLE ADDRESS
EQUIPSUP

**EQUIPMENT & SUPPLY CO., INC.**

NEW YORK LIFE INSURANCE BUILDING
51 MADISON AVENUE
NEW YORK

STEEL EQUIPMENT
BANK & OFFICE FURNITURE
STEEL FILING CABINETS
LIBRARY SHELVING

DISTRIBUTORS FOR
WATSON MANUFACTURING COMPANY
JAMESTOWN, N. Y.

March 25th, 1930

Mr. Don Gardner,
c/o Modern Machine Shop
128 Opera Place
Cincinnati, Ohio

Dear Mr. Gardner:

ALL AGREEMENTS SUBJECT TO DELAYS BEYOND OUR CONTROL. PRICES FOR IMMEDIATE ACCEPTANCE SUBJECT TO CHANGE WITHOUT NOTICE

Due to circumstances entirely beyond our control we are no longer handling the AUTO-SHIFT Drafting Table, and we regret that we shall have to cancel our advertising contract with Modern Machine Shop.

At the present time an advertising salesman from a majority of publications can prove by statistics that practically any product can be sold advantageously through their medium, and the usual failure for results to come up to previous expectations is not surprising.

However, in the case of Modern Machine Shop we have found that your publication not only produces results, but produces the type of inquiry that spells business to any organization. Inquiries from Production Managers, Chief Draftsmen, Vice Presidents, and Engineers have been common since using your publication.

We are indeed sorry that we can no longer use Modern Machine Shop to our advantage, but assure you that if in the future we handle any products that can be sold to factories, machine shops or engineering companies we shall waste no time in renewing our business relations with you.

Very truly yours,

EQUIPMENT & SUPPLY CO., Inc.

By: Watson
Advertising Mgr.

SDL:HB

# Inquiry that Spells Business for *Any* Organization"

## Says S. D. Lyon, Advertising Manager of Equipment and Supply Company, New York City

He adds, "Inquiries from Production Managers, Chief Draftsmen, Vice Presidents and Engineers have been common since using your publication." Read his letter reproduced on the opposite page.

A few days later Mr. Lyon again wrote us as follows:

> "Another feature that may interest you is that our latest advertisement regarding the Jantzen Towel Cabinets has pulled surprisingly well when you consider that we did not expect that such equipment would attract any attention in a publication such as yours, which goes to machine shops and factories."

If you have a product in which metal working mechanical executives can be interested, don't waste any more time. Send us your advertising copy *now* for the next issue—June. Forms close Monday, May the twenty-sixth.

You will GET RESULTS!

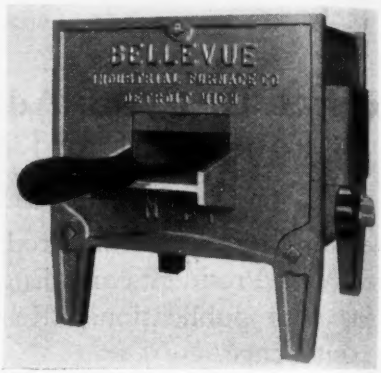
MODERN Machine Shop

128 OPERA PLACE CINCINNATI, OHIO

## New Shop Equipment

(*Continued from page* 92)

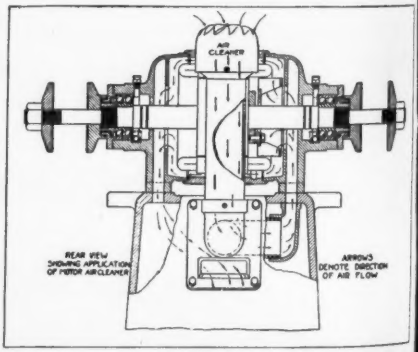
replaced, when necessary, without dismantling the heater. The replacement cost of these elements is said to be small. No auxiliaries, such as blowers, are necessary for operation. The furnace operates on a 110-volt, 15 ampere circuit, drawing 1,600 watts, and can be attached to any 110-volt outlet. Equipment includes an indicating snap switch, 10 feet of flexible heater cord, and attachment plug. The furnace is finished in gray aluminum.




Bellevue Electric Soldering Iron Heater

## Hammond Motor Air Cleaner

The Hammond Motor Air Cleaner, shown in the illustration, is now standard equipment on all Hammond grin-



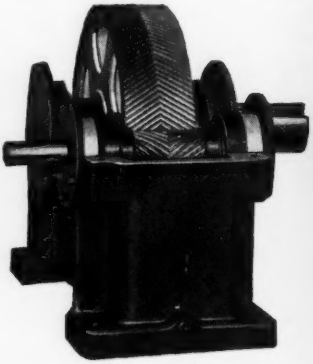

Hammond Motor Air Cleaner

ders and polishers of 3 h. p. and larger sizes. The motor is totally enclosed, but is cooled by a fan on the spindle of the machine. All in-coming air must pass through the centrifugal air cleaner which is directly connected through the pedestal to the cored end bell. The especially designed fan, which is mounted on the spindle, forces the clean, cool air over the motor windings and through the opposite end bell to the pedestal, where it is discharged through the outlet.

This method of cleaning and cooling the air insures an efficient and cool-operating unit, maintaining, as it does, a temperature less than 40 degrees C. The common trouble-makers such as emery dust, metallic dust, chips, and so on, cannot get in to clog the air gap in the motor and damage the motor windings.

## Horsburgh & Scott Speed Reducers

The Horsburgh & Scott Co., 5110 Hamilton Avenue, Cleveland, Ohio, is now manufacturing a line of speed reducers in which the gears are of the herringbone type, as shown in the illustration. The herringbone type of gear is comparatively quiet in operation, strong,



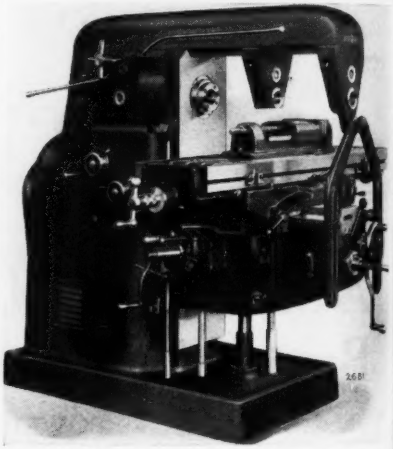
Horsburgh & Scott Herringbone Speed Reducer.

and eliminates end thrust. The pinions are of chrome-manganese steel, forged integral with their shafts, and are ground all over. The teeth are cut on

the Sykes continuous tooth herringbone gear-cutting machines. The gear blanks are pressed onto ground shafts, trued up, and balanced before the teeth are cut. All shafts are then mounted on Timken bearings. Due to the extreme care taken in the cutting operation, no end play or float is required. The speed reducers will be furnished with any gear ratio desired, to deliver from $\frac{1}{16}$ to 200 h. p., in standard size, leak-proof housings.

## Cincinnati No. 4 Plain and Universal Milling Machines

Two new machines — the Cincinnati No. 4 Plain and No. 4 Universal Milling Machines—have been added to the



Cincinnati No. 4 Plain Milling Machine

line of the Cincinnati Milling Machine Co., Cincinnati, Ohio. The No. 4 machines have the same general characteristics as the No. 3 millers announced last September at the Machine Tool Show, but are larger.

The machines have sixteen spindle speeds, ranging from 14 to 450 r.p.m., and sixteen table feeds ranging from ¾-in. to 30 inches, which are changed by an automatic power shift mechanism controlled from either front or rear. The change is effected by shifting the lever located at the front of the knee to the left with starting lever in stopped position until the desired

(*Continued on page* 104)

## New Shop Equipment

(*Continued from page* 100)

speed, as registered on the upper revolving colored dial, appears opposite the arrow. Engaging the starting lever gives the speed selected. Change of feeds is effected by shifting this same lever to the right until the desired feed, as registered on the lower colored dial, appears opposite the arrow.

Independent directional control levers for cross, vertical, or longitudinal movements of the table are provided. Each movement can be obtained with rapid power traverse with the spindle stopped or running, the rates of speed being: longitudinal, 100 in.; cross, 50 in.; vertical, 50 in.

Rear hand adjusting cranks are provided for obtaining accurate cross and vertical adjustments from the rear as well as from the front. The mechanism within the column is automatically lubricated by a geared pump located inside the column. Automatic lubrication by the use of a pump is provided for the knee, while the one-shot system is used for the saddle and table-ways.

Anti-friction bearings are used throughout the spindle drive. The Cincinnati double mounting of anti-friction bearings both front and rear on the spindle, with a floating rear bearing, are used. Gear contacts in the spindle drive have been reduced, giving 4 on the forward and 5 on the reverse, making a positive drive and reducing the wear on the mechanism. A multiple disc oil clutch is used.

The Cincinnati rectangular overarm has been increased in size and strength. Two aluminum arbor supports, of the self-oiling type, are provided, these supports being 50 per cent lighter, yet stronger, than those of cast iron. In addition, new simplified overarm braces are supplied, also lighter, and designed so that they need not be removed when making a vertical adjustment. There are no universal joints, and the vertical drive shaft is enclosed—a feature which adds to the safety of the operator.

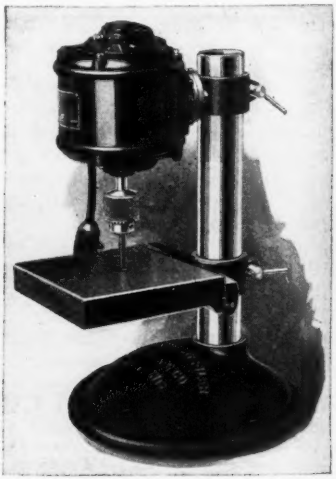
A gutter coolant pump having a capacity of eight gallons is supplied as standard equipment on these machines. The coolant drains from the table into the saddle through a large opening in the rear. The leadscrew construction has been improved, the screw itself being larger in diameter and having a longer bearing in the leadscrew nut. The ends are mounted on a single

mounting of roller bearings which takes up both radial and end thrusts. It is thoroughly lubricated by the one-shot system, which is provided for lubricating the saddle and table ways. The elevating screw is of the single-piece type, eliminating the sleeve, and the thread bearing of the nut has been increased. The general proportions of the column and knee have been increased and narrow guides and new type gibbing have been added.

The table working surface, both machines, is 75 x 16 in.; the longitudinal range is 42 in.; cross range, 14 in.; and vertical range, 20 in. on the plain machine and 18 in. on the universal. Motor recommended, 10 h. p., 1750 r.p.m. Net weight, belt drive, plain machine, 8400 lb. Universal machine, 8700 lb. Motor drive, plain machine, 8500 lbs. Universal machine, 9000 lb. Floor space required, 116 x 138 inches.

## Rausch Rotary Die Filing Machine

The tool shown in the illustration is the Rausch Rotary Die Filing Machine, which has been developed by the Rausch Manufacturing Co., 401 Lake



Rausch Rotary Die Filing Machine

Avenue, Racine, Wisconsin, to eliminate the necessity for hand work in file-finishing irregular-shaped parts. The tool is intended for use on dies, templets, sheet metal model parts, ir-

regular-shaped gages, cams and formers for profiling, for filing radii on dies, fitting punches to dies, and so on. The tool is especially valuable in fitting punches to dies, as the construction is such that the stock can be removed evenly, a surface can be filed flat at right angles to the base of the die, and the operator can easily work close to a scribed line. By using one of the Rausch Type "B" Rotary Files, the shank will act as a stop and an even amount of clearance can be easily obtained around the punch.

The filer can be used with the motor at the top of the column, as shown in the illustration, or the table can be placed at the top of the column with the motor underneath in an inverted position with the file projecting upward through the table, which gives the operator a clear and unobstructed view of his work. The table can be tilted to obtain the desired amount of clearance-angle. The height of the tool is 18 in.; table area, 9 x 9 in.; distance from column to file, 5½ in.; file capacity, ⅜ in.; bench space required, 14 x 14 in., and shipping weight, 105 pounds. Standard equipment includes a ¼ h. p. motor for 110 V., A. C., 60 cycle current.

## U. S. Electrical Tool Co. Combination Blower and Vacuum Cleaner

A combination blower and vacuum especially designed for industrial purposes has been developed by the United States Electrical Tool Co., 2471 West Sixth Street, Cincinnati, Ohio. The tool cleans either by suction or blowing, and will pick up dust or other free dirt wherever the tool's nozzle or brush can penetrate. By removing the dust bag—which is a simple operation—and changing the location of the hose, dust can be blown from places hard to get at, such as the inside of motors, machines and switchboards.

One of the outstanding features of the cleaner is the ease with which it can be handled. By hanging the motor and fan over one's shoulder or on a convenient hook, the operator can get into places not possible with the more ancient types of blowers, and can work longer and with less fatigue because of the absence of weight. The cleaner comes in two sizes, complete with hose, nozzle, brush, canvas bag, and shoulder

"U. S." Combination Cleaner and Blower.

strap. The No. 1 size weighs 7½ pounds net, and the No. 2 size, 9½ pounds. Each size is powered by a universal motor which operates on either alternating or direct current. Body is aluminum.

## Preventing Idleness

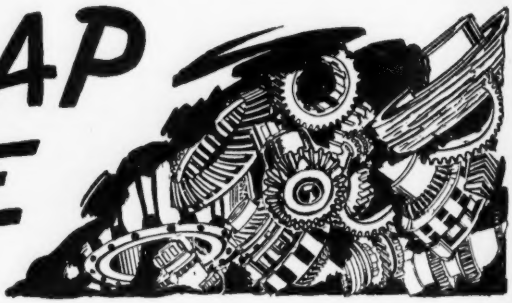
(*Continued from page* 62)

collected on red tags, and plotted curves by departments using a different color for each department. These curves were available at all times to all persons who were concerned in reducing factory burden, and they acted as a guide as to where to concentrate the effort. The main object was to keep the lines on a downward trend and to keep peaks off the chart.

From time to time the idle machine charts were laid out according to months and to machine groups, to give the conditions of each individual group or class groups for a period of six months or more. Then an analysis was drawn off which included all the factors as shown. This shows the production manager where the need for extra equipment exists, where excessive equipment is located, where the flow of work is uneven, the prevailing cause of idleness on certain machines or machine groups, the need of new equipment to replace old where the machine is constantly going idle for repairs, and a number of little details which were of great assistance to the production manager and his staff.

The production manager, his assistant, the tool and operation department heads, foremen, and even workmen consult the idle machine chart daily for this, that, or the other reason, proving that it is of utmost importance to have an up-to-date method of idleness and burden control that will at all times give the exact conditions as they exist in the shop, whether or not these conditions are improving, and where the source of the trouble is.

# THE SCRAP PILE



By Geo. Alexander Mann

**Aw Shuddup**

With hair freshly crimped,
It rained—and Miss Link,
With hands o'er her curls,
Said, "God save the kink."

**Believe It Or Not**

One thing is a cinch—the guy who writes the beautiful "warm and welcome" ads for the bank isn't the one who makes the loans.

**Happy Days Are Here Again**

They've decided to have short skirts for the day time and long skirts for evening. Bless their dear hearts. An' jes' when the days are gettin' longer an' the evenings shorter. Hot dawg.

**A Good Investment**

To collect five bucks he wuz buzzin'—
To bury a salesman, his cousin;
The P. A. said, "Shucks,
Why ask for five bucks?—
Here's sixty—go bury a dozen."

**An' Still Be Consistent**

They may do away with war, but we can always use the war songs for wedding marches.

'Tis hard to tell what to do when arrested—hire a lawyer or tell the truth.

**I Ask Yuh**

A certain judge says, "There isn't anything like hard work." Huh—if there was, would a judge know anything about it?

He lives in peace
With his wife, they say—
He put cement
In her beauty clay.

Wimmin may never have had much spunk, but it took the thinning o' the eye-brow fad to prove that they are there with the pluck.

"We cook with electricity,"
Said waitress Goldie Locks;
He said: "Well, give this steak
A couple more shocks."

What goes on behind the footlights ain't in it with what goes on behind the headlights.

Lotsa folks will never know where the house o' worship is 'til they put a Tom Thumb golf course on the church lawn.

**Drugged Wuz Right**

"The prisoner's been drugged,"
Was the Judge's snort—
"To be sure," said the cop;
"I drugged him to court."

# For Your Catalog Library

**Check any of these useful publications that you want, write your name, firm name, title, and address on the margin, then tear out the page and send to Modern Machine Shop, 128 Opera Place, Cincinnati, Ohio. They will be forwarded to you promptly without cost or obligation. Please restrict your list to not more than ten.**

**Abrasive Grinding Wheels:** The types of wheels, with recommended grades and grains, which should be used for each of the various kinds of grinds are discussed in a booklet which will be sent free to mechanical executives by the Abrasive Company, Philadelphia, Pa.

**Acmelene, The Scientific Threading Oil:** The advantages of using Acmelene, which is an oil that has been developed especially for use in cutting threads, are discussed in a folder that can be obtained without charge from The Acme Refining Co., West 56th St., Cleveland, Ohio.

**Hollow-Milling:** How production can be increased and costs lowered by the use of adjustable hollow-mills with high speed blades and interchangeable shanks is told in a bulletin that has been issued by Ogden R. Adams, 407 Cutler Bldg., Rochester, N. Y. Copy free upon request.

**Aetna Thrust Ball Bearings:** Catalog No. 8, published by the Aetna Ball Bearing Manfg. Co., 4610 Schubert Ave., Chicago, Ill., contains complete descriptions and illustrations of the thrust ball retainers made by this firm. Copy free upon request.

**High Speed Tapping:** The various types of Alto Motor-Driven, High Speed, Self-Contained Tapping Machines are described and illustrated in a series of folders that have been issued by The Alto Manufacturing Co., 1648-52 Wolfram St., Chicago, Ill. Free upon request.

**Broaching By Modern Methods:** Equipment and tools for finishing round, square or irregular-shaped holes and surfaces by broaching are described and illustrated in a booklet that is issued free by the American Broach & Machine Co., Ann Arbor, Michigan.

**Ames Dial Gages:** The latest types of dial gages for inspection purposes are described in the Ames No. 55 Bulletin, which will be sent free to any machine shop executive. Address B. C. Ames Co., Waltham, Mass.

**Scraping By Power:** Bearing surfaces can now be scraped with a power scraper that is quicker and easier than the old-fashioned hand method. The tool is described in a folder that is issued by Anderson Bros. Mfg. Co., 1926 Kishwaukee St., Rockford, Ill. Sent free on request.

**Steel Furniture for the Shop:** The complete line of steel furniture made by the Angle Steel Stool Co., Plainwell, Michigan, including steel stools and chairs, steel foremen's desks, lockers, tables, tool stands, machine tenders, shop boxes and pans, iron bar racks, trucks, bench legs, and bench drawers, is described and illustrated in Catalog "C," which is issued free to machine shop executives.

**Stop Tap Breakage:** A booklet that tells how to stop the breakage of taps, reamers, and other tools, by the use of a friction chuck, also how to use the chuck for setting studs or nuts, has been issued by The Apex Machine Co., 200 Davis Ave., Dayton, Ohio. Sent free upon request.

**Machine Shop Accessories:** Catalog B-27, issued by the Armstrong Bros. Tool Co., 328 N. Francisco Ave., Chicago, Ill., describes the line of tool holders, boring tools, wrenches, pipe tools, ratchet drills, lathe dogs, and other tools manufactured by this company.

**Metal and Wood Saws:** Catalog No. 20 describing saws of all kinds, for both metal and wood. 256 pages of descriptions of saws and sawing machinery. E. C. Atkins & Co., 402 S. Illinois St., Indianapolis, Ind.

**Hobs and Milling Cutters:** A complete line of milling cutters and hobs for cutting all kinds of gears, splines, sprockets and other forms is described in Catalog G, issued by the Barber-Colman Company, Rockford, Ill. Descriptions and illustrations of the Barber-Colman hobbing machine and hob-sharpening machines are included. Sent free on request.

**All-Geared Drilling and Tapping Machines:** A catalog describing in detail the various types of all-geared, self-oiling, drilling and tapping machines made by the Barnes Drill Co., 801-851 Chestnut Street, Rockford, Ill., will be sent free upon request.

**Modern Drilling Equipment:** Circulars describing the various types and sizes of Barnes upright drills, multiple drills and horizontal drilling machines made by this company have been issued by the W. F. & John Barnes Co., Rockford, Ill.

**Automatic Oiled Die Sets:** The automatic oiled die sets, die shoes, punch holders, leader pins, bolster plates, bushings, and other standard die parts made by the E. A. Baumbach Manfg. Co., 1806 S. Kilbourn Ave., Chicago, Ill., are described in Catalog No. 5, which has been issued by that company. Sent free upon request.

**"C-V" Chrome Vanadium Wrenches:** A complete line of wrenches made of Chrome Vanadium steel—practically unbreakable—is described in a booklet that has been issued by the Bonney Forge & Tool Works, Allentown, Pa. Copy free upon request.

**Bradford Precision Lathes:** Precision Lathes for the tool room and for general manufacturing purposes, all-geared and cone types, belt or motor driven, are described and illustrated in a catalog that is issued by The Bradford Machine Tool Co., 657-671 Evans St., Cincinnati, Ohio. The catalog also includes descriptions of taper, relieving, turret and other lathe attachments. Sent free upon request.

**How To Sharpen Staggered Tooth Cutters, Helical Milling Cutters, and Two-Lipped End Mills:** A series of pamphlets on these subjects can be obtained without charge by addressing the Brown & Sharpe Mfg. Co., Providence, R. I.

**Sheet Metal Problems:** The use of the nibbling machine for cutting sheet metal stock is discussed in a booklet which can be had without charge by addressing Andrew C. Campbell, Inc., Bridgeport, Conn.

**High Speed Drill Presses:** A complete line of drill presses that can be run at high speeds with complete safety is described in catalog number 50, issued by the Canedy-Otto Manufacturing Company, Chicago Heights, Ill. This catalog also contains descriptions of other equipment manufactured by this concern. Sent free upon request.

**Boring Tool With Micrometer Adjustment:** A circular describing and illustrating the Palmgren Off-Set Boring Tool, which is adaptable for either tool or production work, can be had by addressing the Chicago Tool and Engineering Co., 84th St. and So. Chicago Ave., Chicago, Ill.

**Bridgebilt Production Chair:** How the Bridgebilt Production Chair will prevent fatigue and increase production is told in a booklet that has been issued by The Chicago Wire Chair Co., 614 N. LaSalle St., Chicago, Ill. Copy free upon request.

**Electric Tools:** The complete line of "The Cincinnati" Electric Drills, Grinders, Buffers, etc., manufactured by the Cincinnati Electrical Tool Company, Cincinnati, Ohio, is fully described and illustrated in their new catalog. Free upon request.

**Gear Data:** The Cincinnati Gear Co., Cincinnati, Ohio, has published Catalog D, which describes and illustrates the various types and kinds of gears made by this firm. The book contains photographs of the plant departments, with descriptions of the equipment employed, and also

OTHER PUBLICATIONS LISTED ON PAGES 122, 124, 126 AND 128.

includes a number of pages of valuable data and reference tables for machine shop use.

**Grinding the Centerless Way:** The advantages of the centerless grinding method is discussed in a booklet which also describes the centerless grinding machines made by Cincinnati Grinders, Inc., Cincinnati, Ohio. The illustrations show various types of jobs in process, and full data is included. Copy free upon request.

**Rapid Traverse Planers:** Cincinnati Hypro Planers, made by the Cincinnati Planer Co., Cincinnati, Ohio, are described in a new catalog that has been issued by this company.

**Bolender Gear Burnishers:** Gears will operate more smoothly and more silently if burnished. Full description of the Bolender Gear Burnisher can be had by addressing the City Machine & Tool Works, Third and June Sts., Dayton, Ohio.

**Handbook For Drillers:** The Cleveland Twist Drill Co., 1242 E. Forty-ninth St., Cleveland, Ohio, has published a book in which the various parts of the twist drill are described, and which tells how to grind a drill correctly. The troubles that result from incorrect grinding are described and illustrated and several chapters are devoted to the subjects of speeds, feeds, materials, cutting compounds, and so on. Sent free upon request.

**Columbia Superior Shapers:** Bulletin No. 17, issued by The Columbia Machine Tool Co., Hamilton, Ohio, describes and illustrates the line of heavy duty shapers made by this firm. Copy free upon request.

**Columbia Tool Steel Handbook:** A book containing valuable information concerning the making of tools, heat treating, uses of hardness testing instruments, uses of the quenching bath, drawing bath, and other heat treating equipment, and together with tables and other useful information can be obtained without charge by addressing the Columbia Tool Steel Co., 550 E. 14th St., Chicago Heights, Ill.

**Broaching for Profit:** A combination round and spline broach which broaches the drilled hole to size, cuts the splines, and removes the burrs in one operation is described in a circular which will be sent free by The Connecticut Broach & Machine Co., New London, Conn.

**Die Makers' Supplies:** A complete line of die sets, leader pins, bushings, and other die makers' supplies are described in a book that is issued by the Danly Machine Specialties, Inc., 2104 South 52nd Avenue, Chicago, Ill. Sent free upon request.

**Davis Keyseaters:** Recent developments in keyseating methods are discussed in a bulletin that also describes the keyseaters made by the Davis Keyseater Company, 250 Mill St., Rochester, N. Y. Copy free upon request.

**Grinding Wheel Dressers:** All of the different types of grinding wheel dressers made by the Desmond-Stephan Mfg. Co., Urbana, Ohio, including Desmond-Huntington, Desmond-Sherman, Zig-Zag, Diamo-Carbo, and diamond dressers, are described and illustrated in a catalog that has been published by the firm mentioned. Free upon request.

**Quantity Drilling:** A semi-automatic multiple spindle drilling machine which is designed to produce the maximum of drilled holes in medium or small parts, is described in a pamphlet that is published by the Detroit Machine Tool Co., 5055 Woodward Ave., Detroit, Michigan. Sent free upon request.

**Precision Grinding:** A booklet which describes and illustrates the most modern methods of performing all kinds of precision grinding operations, showing how the Dumore grinder can be applied to various kinds of machine tools, has been published by The Dumore Company, Racine, Wis. Copy free upon request.

**Interchangeable High Production Tools:** Catalog No. 28, issued free by the Eclipse Counterbore Co., 7410 St. Aubin St., Detroit, Mich., describes and illustrates the interchangeable counterbores, spot facers, end form cutters, and other end cutting tools made by this firm.

**Precision Measuring Instruments:** The latest types and models of dial indicators, thread lead test gages, pitch gages, thickness gages, dial comparators, and other precision measuring instruments marketed by the Federal Products Corporation, Providence, R. I., are described and illustrated in a book that will be sent free upon application to this firm.

**Gear Tooth Shapes:** A study of the fundamental principles of involute gearing and treatise on the development of the standard tooth form are contained in "Gear Tooth Shapes," published by The Fellows Gear Shaper Co., 78 River St., Springfield, Vt. Copy free upon request.

**Questions To Ask Before Buying a Jig-Boring Machine:** A list of the fine points to look for in a jig-boring machine, with descriptions and illustrations of the working parts of the Swiss Jig Borer, can be obtained free by addressing The R. Y. Ferner Co., 1511 K St., N. W., Washington, D. C.

**Silent, Self-Lubricating Gears** for use in all kinds of machines are described in a booklet that can be had upon application to Fibroc Insulation Company, Valparaiso, Indiana.

**Formica Silent Composition Gears:** A booklet telling about the uses and advantages of Formica Silent Shock Absorbing Gears, and containing a considerable amount of valuable data with rules and tables for laying out, cutting and using gears. Sent free by Formica Insulation Co., 4632 Spring Grove Avenue, Cincinnati, Ohio.

**Fosdick Drills:** This publication gives details as to the design and construction of Fosdick Radial, Upright, and Sensitive Drills. Published by the Fosdick Machine Tool Co., Cincinnati, Ohio.

**"Non-Clog" Coolant Pumps** are described and illustrated in a booklet which has been issued by the Fulflo Specialties Co., Blanchester, Ohio. Copy free upon request.

**Modern Grinding Equipment:** The complete line of universal tool and cutter grinders, surface grinders, drill grinders, tap grinders, and other grinding machines made by the Gallmeyer & Livingston Co., 336 Straight St., S. W., Grand Rapids, Michigan, is described in a series of bulletins that have been issued by this firm. Free upon request.

**Flat Surface Grinding:** Automatic, semi-automatic, and single-purpose machines for performing all kinds of grinding operations on flat surfaces are described and illustrated in a book that has been issued by the Gardner Machine Company, Beloit, Wis. Copy free upon application.

**Adjustable Blade Cutters:** Hollow mills, facing tools, face mills, milling cutters and other production tools with adjustable, interchangeable blades are described and illustrated in a booklet that is issued free by the Genesee Manufacturing Co., 141 N. Water St., Rochester, N. Y.

**Greaves-Klusman Lathes:** A book containing complete descriptions of the latest types of lathes made by this firm has been issued by the Greaves-Klusman Tool Co., Oakley, Cincinnati, Ohio.

**Swiss Files:** The complete line of Grobet Swiss Files for use in die and tool work or for other fine work is described and illustrated in Catalog "K," published by the Grobet File Corporation of America, 3 Park Place, New York, N. Y. Copy free upon request.

**Grinding, Polishing and Buffing Machines** of the latest types are described and illustrated in a series of bulletins that have been issued by the Hammond Machinery Builders, Kalamazoo, Mich. Copies free upon request.

**Flexible Shaft Equipment Eliminates Hand Labor:** Files, drills, grinding wheels, and other tools can be mechanically operated by the use of the flexible shaft equipment manufactured by the R. G. Haskins Co., 4653 W. Fulton St., Chicago, Ill. Catalog free upon request.

**Universal Drill Jig:** The John's Universal Drill Jig can be used for drilling, centering, milling, reaming, tapping, and other operations with slight changes. Descriptive circular can be had by addressing the Heuser Manufacturing Co., 1638 N. Paulina St., Chicago, Ill.

**Drilling and Grinding Electrically:** Catalog M, showing and describing a variety of modern electric portable drills, grinders, and other tools, including floor grinders

OTHER PUBLICATIONS LISTED ON PAGES 120, 124, 126, AND 128.

and buffers, has been issued by The Hisey-Wolf Machine Co., Colerain and Marshall Sts., Cincinnati, Ohio.

**Speed Reducers:** A catalog of speed reducers up to 200 h.p. and built to deliver any ratio desired in standard size units can be obtained by addressing The Horsburgh & Scott Co., 5110 Hamilton Ave., Cleveland, Ohio. Give firm name.

**"Houghton's Refrigerant Base" and "Hocut"**—metal cutting oils manufactured by E. F. Houghton & Co., Philadelphia, Penna., are fully discussed, together with their outstanding properties, in two booklets which can be obtained without charge by addressing this firm.

**"Do It Electrically":** The complete line of "Thor" universal electric tools, including tools for drilling, reaming, screw-driving, tapping, nut-setting, grinding, and for performing other operations is described in Catalog No. 17, issued free by the Independent Pneumatic Tool Co., 236 S. Jefferson St., Chicago, Ill.

**"Excel" Precision Filing and Sawing Machine:** A filing and sawing machine for use in producing templets, dies and other irregular-shaped parts is described and illustrated in a booklet which is issued free by Index Machinery Corporation, 49 Central Ave., Cincinnati, Ohio.

**Tool Steel Composition, Selection, and Heat Treatment:** William Jessop & Sons, Inc., 121 Varick St., New York, N. Y., has published a series of pamphlets dealing with the above subjects. Copies free upon request.

**Special Mil-Waukee-Mils of Standard Units:** A milling machine of which the base, heads, columns, and other parts are built in standard units, thus enabling the user to order a machine that will be especially adapted for his job, is described and illustrated in Catalog No. 36, issued by the Kearney & Trecker Corporation, Milwaukee, Wis. Free to machine shop executives.

**Koebel-Wagner Diamonds for Wheel Dressing:** The Koebel-Wagner method of mounting diamonds and the use of the "Dykon" gage are discussed in a bulletin issued by the Koebel-Wagner Corporation, 144 Orange St., Newark, N. J. Free upon request.

**Drill Around Corners:** Holes can be drilled in close quarters by the use of the Koza Right Angle Drill. Can also be used for keywaying or countersinking. A descriptive pamphlet can be had by addressing Chas. A. Koza, 464 Augustine St., Rochester, N. Y.

**Lathe Dogs and C Clamps** are described and illustrated in Catalog No. 80, issued by the W. G. LeCount Tool Works, South Norwalk, Conn. Copy free upon request.

**Air-Operated Work-Holding Devices:** A booklet showing how air-operated chucks and devices of various kinds can be applied to different kinds of machines to save time and labor has been issued by The Logansport Machine Co., Logansport, Ind.

**Punching and Shearing Operations:** A complete line of machines for perforating and cutting metal in practically any size and shape is described and illustrated in a booklet which has been issued by The Long & Allstatter Co., Hamilton, Ohio. Copy free upon request.

**Rapid-Reading Micrometer:** A new type of rapid-reading micrometer, designed to show the reading in numerals, is described in Catalog No. 5, issued by The Lufkin Rule Co., Saginaw, Michigan. The catalog also contains descriptions of the micrometers, calipers, gauges, scales, squares, bevel protractors, and other tools made by this company. Free upon request.

**Gears:** Quick service on gears in either standard or special sizes is available from the Massachusetts Gear & Tool Co., 27 Nashau St., Woburn, Mass. Particulars upon request.

**"A Captain of Industry:"** Pocket Handbook 23-P, issued by The David Maydole Hammer Co., Norwich, N. Y., tells how David Maydole came to make what he considered the best hammer in the world, and also includes descriptions of the various types of Maydole hammers. Several useful tables are included. Copy free upon request.

**Time Saving Machine Equipment:** How machining time can be reduced to the minimum by the use of Wizard chucks, collets and tap holders, turret tool posts, self-centering steadyrests, and other McCrosky equipment is told in a book that is issued by the McCrosky Tool Corporation, Meadville, Penna. Will be sent without charge.

**Polish at Any Speed:** The Mitchell motor-driven polishing lathe, in which herringbone gears are used to transmit power from the motor shaft to the lathe spindle, can be operated at any desired speed. Bulletin can be obtained by addressing the Mitchell Engineering Co., Springfield, Ohio.

**Hi-Production Counterbores:** A counterbore of simple yet highly efficient construction, with positive drive, rigidity, and a number of other features is described in a circular which will be sent free upon request. Address Morse Counterbore & Tool Co., 12281 Turner Ave., Detroit, Mich.

**Nateo Drilling, Tapping, and Boring Equipment** is the title of a publication that has been issued by The National Automatic Tool Co., Richmond, Ind. The book gives details as to construction and uses of "Nateo" multiple drilling and tapping machines.

**Milling Internal Keyways:** A simple method of milling keyways in gears, wheel hubs, and other similar parts with the aid of a drill press and a special tool is explained in a booklet that is published by the National Machine Tool Co., 2271 Spring Grove Ave., Cincinnati, Ohio.

**"The Answer to Your Gear Problems":** Information as to correct methods of cutting and finishing gears will be supplied without charge by The National Tool Co., Cleveland, Ohio. This firm also carries a complete stock of gear shaper cutters and markets the National-Cleveland Spur and Helical Gear Grinding Machine.

**Save Time with Expanding Mandrels:** How expanding mandrels will solve the problem of turning pieces with odd-size holes, and will increase production on duplicate work, is told in a folder that will be sent free upon request by W. H. Nicholson & Son, 136 Oregon St., Wilkes-Barre, Pa.

**Live Centers:** The complete line of live centers manufactured by Nielsen, Inc., of Lawton, Mich., are fully described in a bulletin issued by this company. This bulletin is illustrated with photographs and blueprints of the Nielsen Center. Mailed free upon request.

**Ball and Roller Bearing Data Sheets:** A complete set of data sheets showing all the dimensions and loads at given speeds, and giving instructions for mounting precision ball bearing and Hoffmann roller bearings, can be obtained without charge by addressing the Norma-Hoffmann Bearings Corporation, Stamford, Conn.

**How To Grind Cemented Tungsten Carbide:** A booklet which describes and illustrates the correct methods of grinding tungsten carbide tools has been published by the Norton Company, Worcester, Mass. Copy free upon request.

**Correct Cutter and Tool Grinding:** Grinder Booklet "E," which is illustrated with 48 photographs, tells how to grind tools correctly and economically. It shows how a solid-backed cutting edge reduces cutter costs and increases production per grind. A copy will be sent free by addressing The Oesterlein Machine Company, 3301 Colerain Avenue, Cincinnati, O.

**Speed Reducers:** Speed Reducers to obtain any desired reduction up to 24,000 to 1 are described and illustrated in Catalog 29-A, issued by The Ohio Gear Co., 1335 East 179th St., Cleveland, O. Copy free upon request.

**Die Making Machines:** How dies, templates, gages, etc., can be sawed out, filed, and lapped easily and accurately on Oliver die making machines is fully described in a bulletin issued by the Oliver Instrument Company, 1430 Maumee Street, Adrian, Mich. Mailed upon request.

**Self-Tapping Sheet Metal Screws:** Screws which are threaded and hardened in such a manner as to enable them to cut their own threads as they are screwed into

OTHER PUBLICATIONS LISTED ON PAGES 120, 122, 126, AND 128.

**sheet metal assemblies are described in a folder which is published by the Parker-Kalon Corporation, 192-196 Varick St., New York City, N. Y. Sent free upon request.**

**"Turning With Tungsten Carbide"** is the name of a book that has been issued by The Porter-Cable Machine Co., 300 Wolf St., Syracuse, N. Y. This book answers the most important questions as to the uses of this new cutting alloy, and also describes a new lathe which has been developed especially for use with tungsten carbide tools. Copy free upon application.

**Powell "Blo-Gun" Air Valves:** Air is faster and more efficient than a brush for cleaning machine tables. The use of the Powell Blo-Gun for this purpose is discussed in a catalog that can be obtained by addressing The Wm. Powell Co., Cincinnati, O.

**Tapping Devices, Quick-Change Chucks, Stud-Setting Tools and Bench Tappers:** A catalog describing the various types and kinds of tapping, drilling, and stud-setting devices manufactured by the Procunier Safety Chuck Company, 12 South Clinton Street, Chicago, Ill., can be obtained without charge by addressing this company. The catalog also tells the part that Procunier tools play in obtaining greater accuracy and less tap breakage.

**Engine, Turret, and Gap Lathes** are described in a series of bulletins that have been issued by The Rahn-Larmon Co., 2935 Spring Grove Ave., Cincinnati, Ohio.

**Shape or Slot With This Machine:** The Rhodes Convertible Shaper, made by The Rhodes Manfg. Co., Waltham, Mass., can be used for horizontal shaping or vertical slotting. Details upon request.

**Pullmore Industrial Clutch:** A multiple disc clutch, made in two types, to run in oil or dry, and which is so built that it can be operated at high speeds, is illustrated and described in a folder that will be sent free by the Rockford Drilling Machine Company, Rockford, Ill.

**Universal Openside Shaper-Planer:** The need of a machine tool to fill the gap between the shaper and the planer has been filled by the development of the Rockford Universal Openside Shaper-Planer, made by the Rockford Machine Tool Co., 2414 Kishwaukee Ave., Rockford, Ill. Full description on request.

**Correct Industrial Seating** and its relation to fatigue, production, quality work, and problems affecting both workers and employers is discussed in a booklet that can be obtained without charge by addressing Royal Metal Manufacturing Co., 1131 S. Michigan Blvd., Chicago, Ill.

**Automatic Lubrication:** Individually motor-driven pumps that keep the work flooded with lubricant are described in a booklet that has been published by the Ruthman Machinery Co., Front and Pike Sts., Cincinnati, Ohio.

**Safety Grinding Wheels:** The complete line of grinding wheels made by the Safety Grinding Wheel & Machine Co., Springfield, Ohio, is described in Catalog No. 11, which is issued by this firm. The book also contains instructions for operating grinding wheels, tables of grinding wheel speeds, pulley calculations, and other information for the user of grinding wheels.

**Saving Time With Small Tools:** A line of time-saving small tools, including "Use-'Em-Up" drill sleeve, "Wear-ever" chucks, collets, cutters, reamers and tap holders, counterbores, spotfacers, and other tools is described in Catalog 36, issued by Scully-Jones & Co., 1909 S. Rockwell St., Chicago, Ill.

**Equipment For the Shop:** Vises for the bench, drill press, milling machine or shaper; angle plates; adjustable clamps, jacks and other tools for the machine shop, are described and illustrated in a booklet that is published by the Sheldon Machine Co., 3253-55 Cottage Grove Ave., Chicago, Ill. Copy free upon request.

**Economies in Material Handling:** A volume of facts about planned load handling, with actual examples of economies in time, material, and labor costs that have been effected with Shepard electric hoists will be sent free upon request to Shepard Niles Crane & Hoist Corp., 424 Schuyler Ave., Montour Falls, N. Y.

**Rapid Drill Jigs:** How time can be saved and drilling operations made easier by the use of a quick-acting drill jig is told in a booklet that is issued free by the Slewek Tool & Die Co., 10230 Woodward Ave., Detroit, Michigan.

**"Metal Cutting"** is the title of the book that describes the latest methods of cutting metals, and includes descriptions and illustrations of both the band saws and inserted-tooth metal-cutting saws made by the Simonds Saws & Steel Co., Fitchburg, Mass. Copy will be sent free upon application to the firm mentioned.

**The Most Efficient Speed** for the operation of special production units, power conveyors, and other machinery by the use of the WHS Speed Reducer and how it can be obtained is told in a bulletin that will be mailed free by Winfield H. Smith, Inc., 30 Eaton St., Springville, N. Y.

**Shaping with Modern Equipment:** The Smith & Mills Company, 2889-91 Spring Grove Avenue, Cincinnati, Ohio, has issued a booklet which describes and illustrates the line of modern shaping equipment made by this firm. Copy free upon request.

**Accurate Gages Speed Production:** The complete line of snap, plug, ring, pin, dial indicator, and special gages made by the Standard Gage Co., Inc., Poughkeepsie, N. Y., is described and illustrated in Catalog No. 4, which can be had without charge by addressing this firm. Johansson gage block sets and accessories are also listed in this book.

**Machinists' Tools and Gages:** Catalog No. 24, issued by the L. S. Starrett Co., Athol, Mass., describes and illustrates the complete assortment of machinists' fine tools and gages made by this firm. Copy free upon request.

**Engineering and Manufacturing Service:** A complete engineering and manufacturing service for manufacturers who are not equipped to handle all of their own designing, experimental, or production work is described, with illustrations of the equipment available, in a bulletin that is issued by The Steel Products Engineering Co., Springfield, Ohio.

**Flexible Shaft Equipment:** The uses of the flexible shaft for drilling, grinding, and other operations is discussed in a booklet which also describes and illustrates the flexible shaft equipment made by N. A. Strand & Co., 5001 N. Lincoln St., Chicago, Ill.

**Cutting Oil Data:** A series of booklets containing valuable information about cutting oils and their uses for thread-cutting, broaching, and general cutting purposes will be sent free to any mechanical executive by D. A. Stuart & Co., 2727 South Troy St., Chicago, Illinois.

**Cutting and Grinding Facts:** A discussion of cutting oils and lubricants, together with descriptions and illustrations of various kinds of jobs upon which cutting oils are used, is contained in a booklet that is issued by the Sun Oil Company, Finance Building, Pittsburgh, Pa. Free upon request.

**Precision Measuring Instruments:** The gages, micrometers, and other precision measuring instruments made by the Swedish Gage Co. of America, 7310 Woodward Ave., Detroit, Mich., are fully described in an interesting booklet that has been published by this firm. Copy free upon request.

**Snap, Plug, Ring, and Thread Gages:** The complete line of precision gages made by The Taft-Peirce Manufacturing Co., 32 Mechanic Ave., Woonsocket, R. I., is described in a folder which can be obtained, free, by addressing this company.

**Save Cutting Oil:** How cutting oil can be separated from chips and thus reclaimed by the use of a centrifugal chip "wringer," is told in a bulletin that is issued free by the Tolhurst Machine Works, Troy, N. Y.

**Chuck With Air:** How time and labor can be saved by the use of air-operated chucks, cylinders, and other equipment is told in a book which describes "Hopkins" Air-Operated Equipment. Published by The Tomkins-Johnson Company, 620 N. Mechanic St., Jackson, Mich. Sent free upon request.

OTHER PUBLICATIONS LISTED ON PAGES 120, 122, 124, AND 128.

**A Simplified and Improved Drive Control for Machinery:** Two distinct types of plate clutches that have proved successful highly in the driving mechanism of machine tools are described and illustrated in a bulletin that will be sent free by the Twin Disc Clutch Company, Racine, Wis.

**Powerful, Easy-Acting Chain Hoists** of the most modern design are described and illustrated in a booklet that is issued by the Union Manufacturing Co., 296 Church St., New Britain, Conn. Copy free upon request.

**Multiple Drilling With a Single-Spindle Drill:** Methods by which multiple drilling may be done on a single-spindle drill, using multiple spindle drill heads, are discussed in a bulletin that is issued by The United States Drill Head Co., 1954 Riverside Drive, Cincinnati.

**Electrically-Driven Portable Tools:** The "U. S." line of electric drills, die grinders, electric screw drivers, surface grinders, tool post grinders, and bench and floor grinders is described in Catalog No. 24, which has been published by The United States Electrical Tool Co., 2471 W. Sixth St., Cincinnati, Ohio.

**Eliminate Clamping Time:** Work can be held without clamps on grinders, planers, and other machines by the use of Walker Magnetic Chucks that are described and illustrated in a series of folders that have been issued by the O. S. Walker Co., Inc., Rockdale St., Worcester, Mass. Copies free upon request.

**Accuracy in Thread Production:** How accurate threads can be produced by the thread miller is told in a pamphlet that can be obtained free by addressing the Waltham Machine Works, Box 296, Waltham, Mass.

**Tool Chests for Machinists and Toolmakers:** The complete line of fine tool chests for machinists and toolmakers made by J. M. Waterston, 420 Woodward Ave., Detroit, Mich., is described in Catalog No. 25. Ask for it.

**"Wedge-Lock" Multiple Bit Tool Holder:** A new type of tool holder, in which the tool bit is held by the action of a wedge, is described in a bulletin which will be sent free upon request by the Wedge-Lock Tool Co., 2521 N. Keeler Ave., Chicago, Ill.

**Screw Machine Products:** Full information as to the manufacturing service on screw machine products maintained by Western Screw Products Co., 19-31 St. George St., St. Louis, Mo., will be sent upon request.

**Shop Furniture:** A catalog describing and illustrating all kinds of shop furniture, including benches, vises, steel stands, foremen's desks, chip trucks, steel racks for bar stock, steel tote boxes, and other equipment will be sent free upon application to The Western Tool & Manufacturing Co., 1620 East Pleasant Street, Springfield, Ohio.

**Wetmore Adjustable Reamers:** The exclusive features of the Wetmore Adjustable Shell Reamer are discussed in Catalog No. 29, issued by the Wetmore Reamer Co., 62 27th St., Milwaukee, Wis. Copy free upon request.

**Drill Horizontally:** The advantages of the "Whirlwind" Horizontal Drilling Machine for high speed drilling on small work are discussed in a bulletin which has been issued by Whirlwind Products Co., 1737 Ludlow St., Indianapolis, Ind. Copy free upon request.

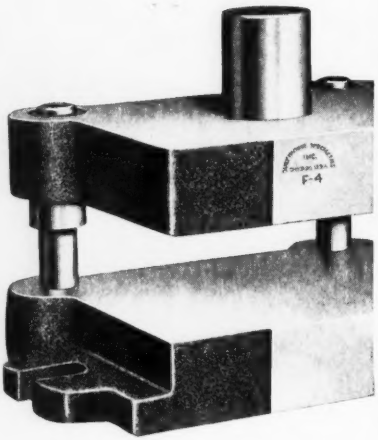
**Wrenches For Every Use:** "Guaranteed Against Breakage" tappet wrenches, pipe and fitting tongs, offset wrenches, and wrenches for all other uses are described and illustrated in a series of folders which can be obtained without charge by addressing J. H. Williams & Co., Buffalo, N. Y.

**"An Inspection Tour of Industrial Plants"** is a booklet published by Wilson-Maeulen Co., Inc., Concord Ave. & 143rd St., New York, N. Y., showing the heat-treating equipment in use in a number of industrial plants, and discussing the manner in which such equipment is automatically controlled. Copy free upon request.

OTHER PUBLICATIONS LISTED ON PAGES 120, 122, 124, AND 126.

MODERN
# Machine Shop
$2.00 Per Year
May, 1930

# *What* DO YOU EXPECT OF A DIE SET.....?




*Standardized, interchangeable punch and die holders;*

*Ample clamping surface or slotted ears;*

*Wide range of shank sizes, or without shanks;*

*Working surfaces ground parallel;*

*Guide posts and bushings, hardened, ground and lapped, maintain parallelism of punch and die holder "without perceptible shake";*

*Of semi-steel or steel die holder and semi-steel punch holder.*

IF IT'S a worth-while feature, you will find it in Danly Die Sets. Accuracy, ruggedness, time-saving features and easy handling cut costs wherever they are used. Ask for the new catalogue.

DANLY STANDARDS

## DANLY MACHINE SPECIALTIES, INC.

2122 S. 52nd AVENUE, CHICAGO

| Detroit, Mich. | Cleveland, Ohio | Rochester, N. Y. | Long Island City, N. Y. |
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| 1549 Temple Ave. | 1444 E. 49th St. | 16 Commercial St. | 36-12 34th St. |

# 15 Hisey TexDrive Buffers Contribute to Cadillac's Progress

Wherever one Hisey TexDrive Buffer goes, more are sure to follow. It has happened in scores of instances. For example . . . the Cadillac Motor Car Company needed new buffing equipment. Investigation of the advantages of the Hisey TexDrive Buffer led to the purchase of one machine. It established such unusual records for low cost production and increased efficiency that fourteen additional TexDrive Buffers were ordered.

*A few of the features that influenced the decision in favor of Hisey TexDrive Buffers:*

*Planed Ways Permit Easy Adjustment of Motor*: Motor is moved forward or backward on ways to secure proper belt tension. No idler pulley necessary.

*Wide Range of Spindle Speeds*: Spindle speed changes easily made by changing motor pulley---using the same drive. This change is easily made due to the accessibility of all parts.

*Gooseneck Design*: Spindle and buffing wheels extend forward from base of machine giving operator new freedom of action. Permits handling large pieces with ease.

*Quick Change of Belts*: No parts need be removed.

*Flex-Steel Conduit and Fittings*: Meet all underwriters' requirements.

*WRITE FOR BULLETIN 42*

## THE HISEY-WOLF MACHINE CO.

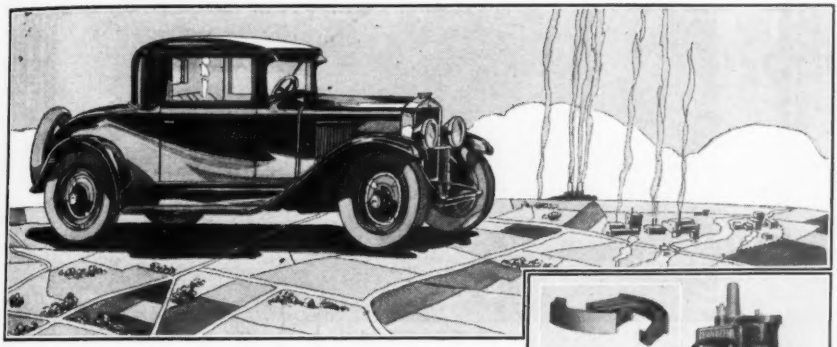
*It's High Grade If Hisey Made"*

Hisey

*Established 1896*
CINCINNATI, OHIO, U.S.A.

*Electric* DRILLS . . . GRINDERS . . . BUFFERS

# THE PACE IS FAST!



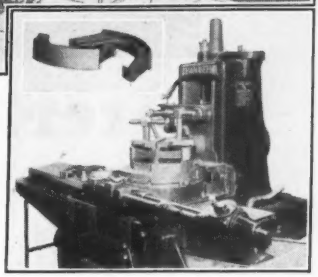
Picture the traveling salesman. He might be selling anything . . . groceries, hardware . . . or machine tools. In former years much of his time was spent waiting for railroad trains . . . lounging in small-town hotels . . . or in idle smoking car conversation. If business was good he had only time enough to skim the cream from his territory . . . was forced to neglect out-of-the-way customers for it would be an endless task to reach them. . . . He was at the mercy of transportation facilities which prevailed fifteen or twenty years ago.

But conditions have changed. The pace in selling has speeded up to match the tempo of modern production. The aggressive salesman now travels alone and travels fast, by automobile instead of waiting on infrequent train schedules . . . and covers his field in half the time and with far greater efficiency.

Sales economy and manufacturing economy go hand in hand . . . but efficiency in production is of first importance. Nowhere can one find such a complete picture of real production efficiency than in the automotive industry. Modern machine tools and mass production methods are making the automobile a great economic factor in present day business. And progressive Milling Methods play no small part in this development.

In the world's leading automobile plants Milwaukee Milling Machines are being used in ever-increasing numbers for their accuracy and dependability have gained wide-spread recognition.

K & T leadership in all industries is the result of 'Milwaukee' efficiency in the hands of the user.



*This Mil-waukee-Mil Simplex released three operators for other work, replaced several other machines in the line with a resultant saving in floor space, and actually increased production over 100%.*

*The problem was to circular-mill automobile brake shoes—malleable castings 2½" wide and 11½" around the periphery. A 1403 Simplex with simple hand clamping fixture and skip-feed rotary table assured continuous production.*

*As proof that Milwaukee Milling Machines successfully meet the production and accuracy requirements of the Automotive Industry it is our privilege to give you the names of some of the users in the passenger car field. Does not the judgment of these leaders inspire confidence?*

*Buick Motor Company*
*Cadillac Motor Car Co*
*Chevrolet Motor Co.*
*Chrysler Corporation*
*James Cunningham & Son Co*
*Dodge Bros. Corp*
*Duesenburg, Inc*
*Franklin Automobile Co*
*Fisher Body Corp*
*Ford Motor Co.*
*Gardner Motor Co.*
*General Motors Corp.*
*Hudson Motor Car Co.*
*Hupp Motor Car Corp.*
*Lincoln Motor Co.*
*Lycoming Manufacturing Co.*
*Marmon Motor Car Co*
*Moon Motor Car Co*
*Nash Motors Company*
*Oakland Motor Car Co.*
*Olds Motor Works*
*Packard Motor Car Co.*
*Pierce-Arrow Motor Car Co.*
*Reo Motor Car Company*
*The Studebaker Corp. of America*
*Stutz Motor Co. of America*
*Willys-Overland Company*

**KEARNEY & TRECKER**
**MILWAUKEE**
**MILLING MACHINES**

**IF IT CAN BE MILLED--MILL IT FASTER!**

PATENTED

# Centerless Grinding Out-of-Balance Work

THE ability of the Cincinnati Centerless Grinder to quickly and accurately grind out-of-balance work further emphasizes the adaptability of the centerless grinding method to a wide variety of work.

Out-of-balance parts, as for example golf club heads, are ground by the in-feed method. Work is held in firm contact with work support blade by the overhead pressure shoe. This overcomes any possibility of the out-of-balance end of the part to affect efficient grinding.

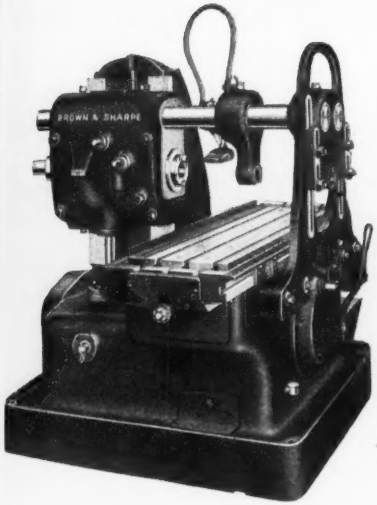
Because of its fast production and ease of operation, Cincinnati Centerless Grinders pay for themselves in a very short time. Large savings are effected by centerless grinding rough or previously machined work. Have you fully investigated the possibilities of adapting this profit-earning precision tool to handle your grinding jobs? All details are illustrated in our centerless grinder booklet. Write for a copy.

*This is the seventh of a series of advertisements to tell you the advantages of the Centerless Grinder. Watch for those to follow.*

**CINCINNATI GRINDERS INCORPORATED**
**CINCINNATI, OHIO U.S.A.**

7 WHAT CENTERLESS GRINDING *means* TO YOU

CINCINNATI




# The New

## Brown & Sharpe No. 13B Plain Milling Machine

## IMPROVED PRODUCTION FEATURES—

Base, Table Ways and Column are cast in one piece.

Massive Table with wide bearing surfaces.

All power movements of table can be controlled by Adjustable Dogs. A wide variety of operating cycles obtainable. Directional Hand Control of Table by Single Lever.

Multiple Dry-Disk Clutch provided with automatic compensation for wear.

Anti-Friction Bearings throughout.

Arbor Yokes, Cutters and Arbor can be removed without disturbing the outer brace.

Automatic Lubrication provided for Spindle Head, Speed and Feed Assemblies and Main Driving Mechanism. Single station provided for lubricating table bearings.

The New No. 13B Plain Milling Machine is exceptionally compact and rigid, with powerful cutting qualities and greatly simplified control. Operation of the machine is simple—two levers controlling all functions.

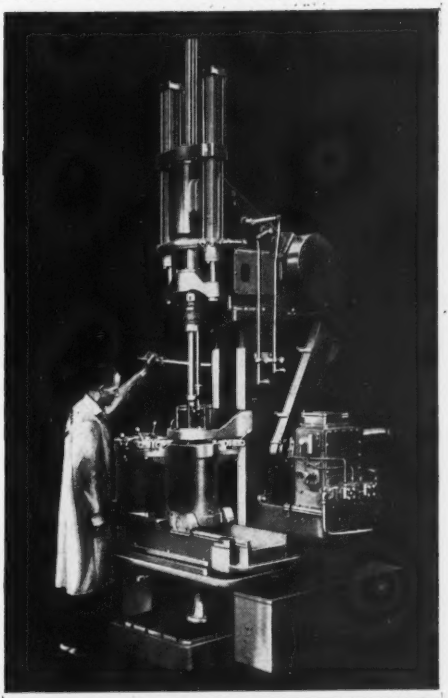
***Detailed specifications on this machine will be sent upon your request.***

**BROWN & SHARPE**

BROWN & SHARPE MFG. CO. PROVIDENCE, R. I., U. S. A.

NO. 2420 SELF-OILING, ALL-GEARED CYLINDER HONING MACHINE

# for HONING MEDIUM SIZED CYLINDERS » » »

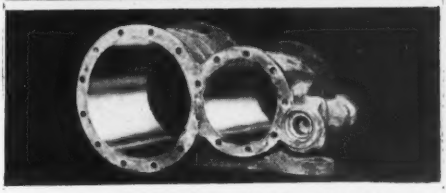


No. 2420 is our latest development for Self-Oiling, All-Geared Vertical Honing of cylinders up to 20" diameter. This size machine is ideal for honing the cylinders used in railroad equipment, several of which are illustrated.

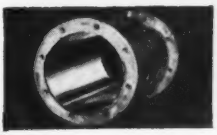
The machine shown is tooled for honing Diesel engine cylinder liners 9" diameter by 23½" long. The duplex fixture, rolling on ball bearings, provides a spare station for loading while honing is in process. Other types of fixtures can be provided for work honed in small quantities.

The superior quality, speed and economy of honing small cylinders is well established by the eminently successful operation of Self-Oiling, All-Geared Single Spindle Honer No. 249 and our Multiple Spindle No. 214. No. 3420, recently introduced, hones cylinders up to 54" long, has 56" stroke and swings 36". Now No. 2420 makes the advantages of Self-Oiling, All-Geared Cylinder Honing available for medium sized work. Write today for description and specifications of this machine.

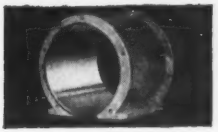
Ask for Bulletin 2420 U



Locomotive Cross Compound Air Pump Cylinders

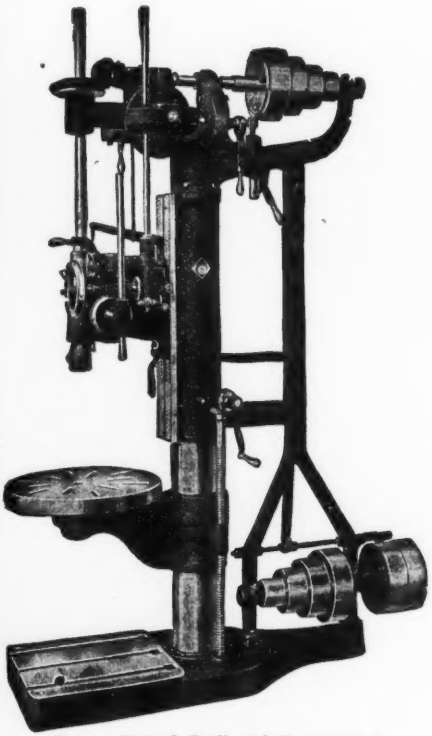


Power Reverse Cylinder for Locomotive



Railroad Air Brake Cylinder

BARNES DRILL CO.
801-851 CHESTNUT STREET
ROCKFORD, ILLINOIS, U. S. A.



Barnes 26-inch Drill with Power Feed and Automatic Stop.

# Barnes

## UPRIGHT

# Drills

With Stationary Head—
15, 20, 22½, 25-inch
swing.

—

With Sliding Head—
22, 26, 28, 34, 42, 50-inch
swing.

—

Gang Drills—
20 to 26-inch swing.

Barnes Upright Drills are made in a range of sizes from the 50-inch swing, required in the railroad shop, to the 15 and 20-inch sizes used in the small machine repair shop and garage service.

Arranged for Silent Chain or Belted Motor Drive. With or without Power Feed.

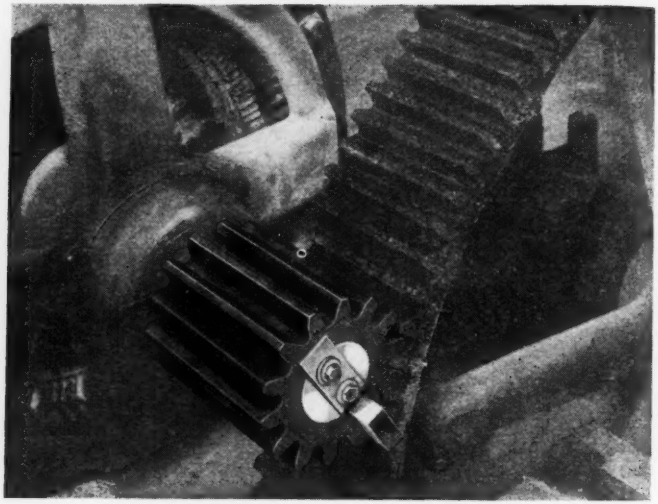
*Write for Our Circulars Giving Complete Information*

## W. F. and JOHN BARNES CO.

**ROCKFORD, ILLINOIS**

Upright Drills Screw Presses

Horizontal and Vertical Production Drilling and Boring Machines



# THIS GEAR
## Will Help You With Your Job

QUIET, smooth running machinery is a feather in the cap of the maintenance man. It sounds as though he were on the job. Maintenance men have found that Formica gears help them to make good.

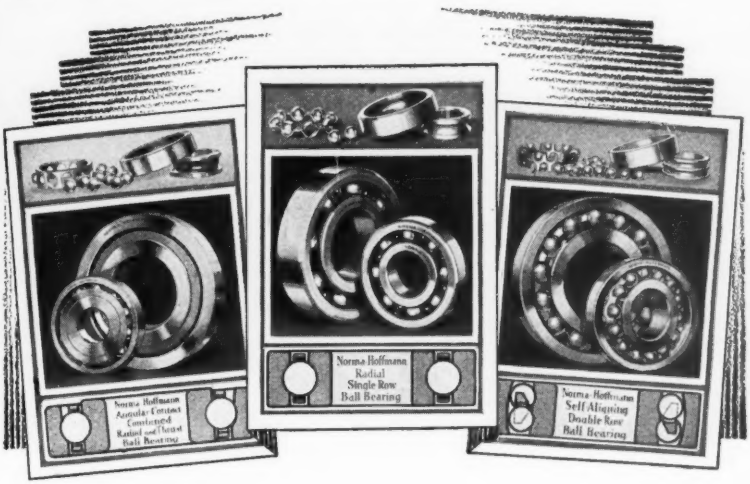
For the same reason more machinery manufacturers use Formica all the time. It makes their machines easier to sell. Their sales departments want it.

*Specify Formica the next time you need a replacement gear.*

**THE FORMICA INSULATION COMPANY**
4632 SPRING GROVE AVENUE CINCINNATI, OHIO

**FORMICA**

# BIG BALL BEARINGS ?
## yes!- up to 18½-inch bore!




**The size you need—the type you require—with the PRECISION that means extra value in the way of longer life and higher efficiency.**

●

## "NORMA-HOFFMANN"
## PRECISION BALL BEARINGS

The three standard types, pictured and detailed above, are available to you in a range of sizes to meet your needs. All are marked by that NORMA-HOFFMANN Quality which means extra speed-ability, extra load-ability, extra service-ability. *Better Bearings* for those seeking *Better Service.*

*Write for catalogs. Let our engineers help you.*

**NORMA-HOFFMANN BEARINGS CORPORATION STAMFORD, CONN., U.S.A.**

PRECISION BALL, ROLLER AND THRUST BEARINGS

# LITTLE LESSONS IN GRINDING COSTS

## *What type of motor is it best to use?*

"OF COURSE, we build our grinding machines to take any type of motor specified," Charley Smith explained, "but I personally am strong for the constant-speed squirrel-cage A. C. motor. All things considered, it has proved to be the best bet. It has the most favorable operating characteristics—in maintenance of speed, efficiency, power factor, low first cost and cheap maintenance.

"On the face of it, a *variable-speed* D. C. motor would appear to be ideal. It permits a fine adjustment of speed, so that the spindle speed can be steadily increased as the grinding wheel wears down, thus maintaining grinding efficiency.* Nevertheless, I know of several plants where D. C. motors are not permitted on grinding machines. If you ever had a D. C. motor 'run away,' you will understand why. The speed is increased by interposing a variable amount of resistance in the field circuit. If this field circuit is broken for any reason—by a loose connection, or a short circuit or mechanical damage—the motor speeds up until something breaks. On a grinder that something is nearly always the wheel. And the consequences are generally serious. Furthermore, a special rheostat is required for each individual motor, if *accurate* speeds are to be obtained.

"*Constant*-speed D. C. motors are subject to the same hazard of field failure, but to a lesser degree because there are not as many connections to maintain and to be responsible for. Field failure relays may be employed, but they are delicate devices that add to cost, inspection and maintenance.

"The *multi-speed* type motor for alternating current is another which is fine in theory, but is limited in practical application. The speed steps are too wide for efficient grinding. And the low load factors at high speeds cause very poor power factors.

"So the A. C. constant-speed motor is the type we strongly recommend for our grinders. We use perfectly standard stock motors, hook them up by positive drive to the grinding wheel spindles, and provide fool-proof *mechanical* means of changing speeds as the wheels wear down.

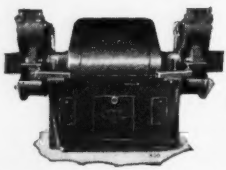
"It must be that we're on the right track. The SAFETY grinders have been a phenomenal success. Almost without exception they have come out on top in competitive trials. Now, if you will get out one of your Purchase Requisition forms, I'll give you the exact specifications on the particular grinder you need for your work in this plant" . . .

* * * * *

How about it? May we do the same for you? The coupon is for your convenience. It involves no obligation on your part, but may be a source of real profit to you.

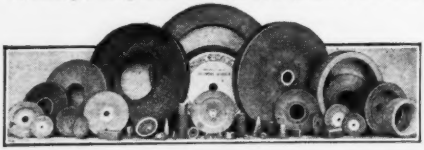
* See preceding adv. in this series. We will send you a reprint of it if you wish.

**The SAFETY Grinding Wheel & Machine Co.**
**Springfield, Ohio**



The SAFETY "Rite-Speed" Grinder automatically enforces an increase in speed as the wheels wear down, yet does so **mechanically**, not electrically. This permits the use of a constant speed A. C. motor . . . it can't "run away." Ask for Bulletin F-28-3.

***"A wheel for every need"...backed by 37 years' experience.***

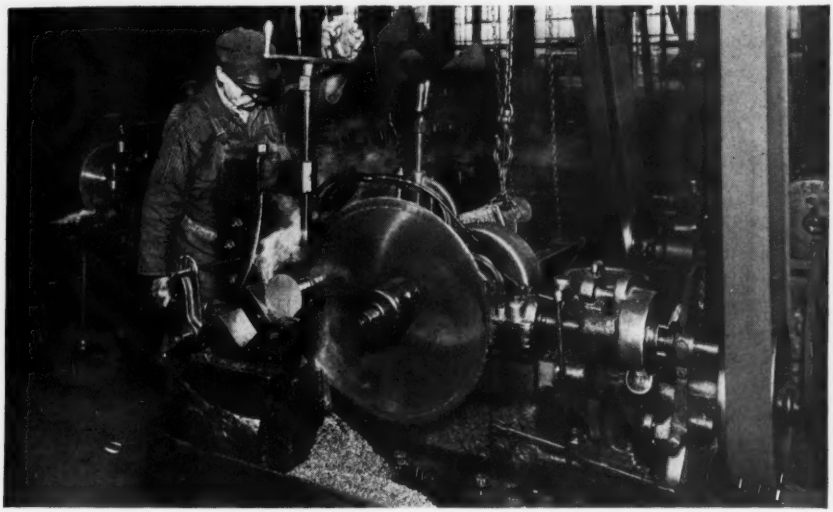


**SAFETY Wheel and Grinding Machine Co.,**
2354 Columbus Ave., Springfield, Ohio.
Please send us file data regarding:
( ) "Rite-Speed" Grinders.
( ) "De Luxe" Portable Grinders.
( ) SAFETY Grinding Wheels.

.....
(Name of Individual)
PIN THIS TO YOUR LETTERHEAD

# The Metal Cutter and Grinder

MAY 1930



## Another Big Plant Uses Simonds Inserted Tooth Metal Saws

### Machine Equipped with Curved Gullet Red Streak Saw Speeds Up Production

In order to demonstrate the wide use of Simonds Red Streak Inserted Tooth Metal Cutting Saws we illustrate above a Simonds saw operating in a nationally known factory in Worcester, Mass. This saw is the new type Red Streak blade with the curved gullets and teeth of special design high speed steel which has been adapted by many of the metal working industries in every section of the United States, Canada and in Great Britain. This particular Red Streak saw is cutting hard metal. Note the smoke curling away as the saw bites through the heavy, tough stock.

If you have metal cutting problems consult our engineers.

# Many Mechanics Use Ground Flat Stock

## A Superior Simonds Steel Perfectly Ground and Ready For Use

Simonds Ground Flat Stock, now being offered the metal industry is a time and money saver. It comes perfectly ground to thickness for adaption to use by die makers and other mechanics in the making of gauges, jigs, templates and various tools. Simonds Ground Flat Stock is made of high-grade carbon tool steel and is uniformly annealed. It is cut to proper length and the most accurate grinding as to width and thickness is done by a new Simonds method.

Ground Flat Stock is furnished in all standard thicknesses. As a time saver it develops into a money saver. Write Simonds Saw and Steel Co., Fitchburg, Mass., if you wish to know how this steel can be most efficiently used in your plant.

# Simonds Makes Finest Tool Bits

Simonds Tool Holder Bits being made of special High Speed Steel which is initially harder than regular high speed steel, gives longer service and a finer, smoother cut. In performance they maintain a constant run without variation of standard. Used over a period of time they show a decided saving in production costs. These bits dispense with the necessity of many extra grindings, new set-ups and the labor involved.

To know their quality mechanics should try them.

SIMONDS

METAL SAW MAKERS

WHEN you see [illegible] brilliant symbols—the "[illegible]nd" or "Red Back Edge" [illegible]lack Saw Blade you [illegible] assured it is SIMON[illegible]ark; positive assuranc[illegible] the world's best Hack [illegible] possible to produce—[illegible]s of better steel that [illegible]much longer service.

Ask your supply deal[illegible]ese

"RED STR[illegible]"
HACK S[illegible]

SIMONDS SAW AND [illegible] Co.
"The Saw Makers"
ESTABLISHED 1832 [illegible]
Eight Factories [illegible]

[illegible]ade with [illegible]

The Blade [illegible] Red Back-

you see ...bril-
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ack Edge" ...lack
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SIMON...ark;
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...STRE...
...CK SA...
...AW AN... Co.
...The Saw Make...
...Branches

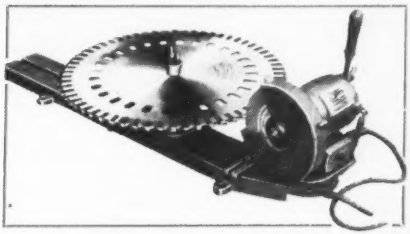
Both kinds for either
Hand or Power Machine Use

...lade with the Red End—Tungsten Steel

...e Blade ... Red Back—High Speed Steel

# The Most Efficient Metal Saw Grinder

## Metal Saws Portable Machine Made By The Makers of Simonds



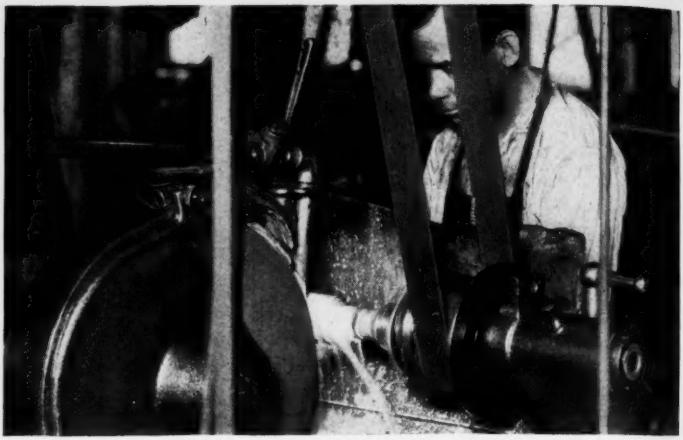
Here is another unit of the famous Simonds quality Red Streak products. A metal saw grinder of the most efficient type for which there is now a big demand. It meets the requirements for a portable machine, combining economical operation with most satisfactory performance. It is carefully and strongly built and requires a minimum of upkeep.

A 7-inch diameter Abrasive Wheel one-half inch thick is mounted on the spindle of a quarter horse-power motor which runs at a constant speed of 3400 R. P. M., the ideal cutting speed for these wheels. The motor is adapted to run on a regular lighting circuit of 110 volt capacity, either alternating or direct current. For use on power circuit machines can be furnished with 220 volt motors.

# Simonds Mill File For Performance

Users of Simonds Mill Files have found that they cut quickly and easily on lathe work and draw filing. This deep cutting file is well liked by mechanics who have a large amount of filing to do. It is tapered about one-third of the way from point back toward the heel. Although the mill bastard is the most generally used, there are many mill second-cut and mill smooth Simonds files used. If you prefer this file with one or two round edges, your supply dealer can get them for you.

# ABRASIVE



## Grinding Master Gauge Plugs...

An operation that requires the highest degree of accuracy, uniformity and close tolerance limits.

In this instance shown above, the tolerance must be kept within .0001" plus or minus and in addition a mirror finish is required.

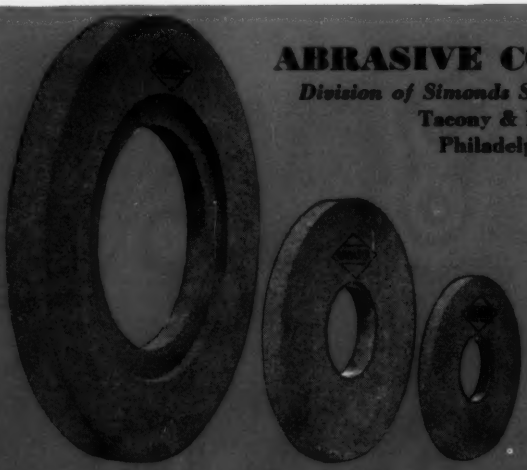
Abrasive grinding wheels have a real duty to fulfill in the plant of this manufacturer and day after day they grind consistently with a fast, cool, free cutting action.

The manufacturers of many types of machine tools have found that Abrasive Wheels prove exceptionally satisfactory for the grinding of the many small parts which go to make up the complete machine.

May we consult with you regarding your grinding problems?

**ABRASIVE COMPANY**
*Division of Simonds Saw and Steel Co.*
Tacony & Fraley Streets
Philadelphia, Penna.

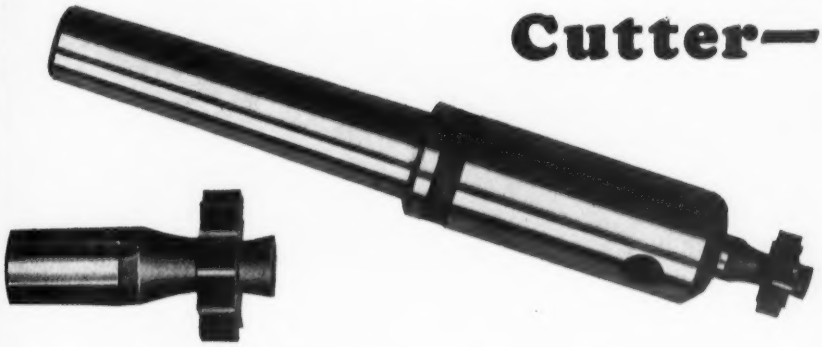
GRINDING WHEELS



ABRASIVE

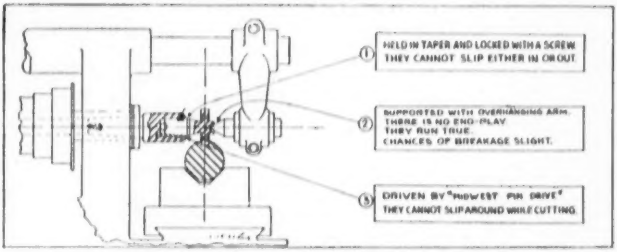
# Index to Advertisements

# The Midwest Keyway Cutter—



## Gives Better Service

Working at faster speeds, producing more accurate keyways, reducing spoilage, saving money — that's the kind of service you get from the Midwest Keyway Cutter.




THIS CHART SHOWS THE RIGID SET-UP OF THE MIDWEST KEYWAY CUTTER

The chart shows at a glance the features which make such service possible. Held in the taper shank and locked with a screw, the cutter can slip neither in nor out of the holder. Supported with overhanging arm, there is no end play and the cutter runs true. Driven by "Midwest Pin Drive" the cutter cannot slip around while cutting.

And, all standard sizes are stocked to meet practically all of your requirements. If you have some special requirement, consult our engineering department. They'll solve your problem for you.

***Your copy of our catalog is ready — where shall we send it?***

# Midwest Tool & Mfg. Co.

**2362 West Jefferson Avenue** **Detroit, Michigan**

# BONNEY

## *CV Chrome-Vanadium

# DOUBLE END BOX WRENCHES

SET NO. 29

SET NO. 33

SET NO. 31

**SOLD IN SETS,** *as illustrated*

**Bonney Double End Box Wrenches are designed with double hexagon openings, making it possible to remove nuts or bolts, even when obstructions will only permit a one-twelfth turn at a "bite." They are wonderfully strong, yet are thin and light in weight.**

***Set No. 33*** **contains nine wrenches with openings from 7/16 to 15/16 inches (the Nos. 2814, 2816, 2818, 2820, 2822, 2824, 2826, 2828 and 2830) neatly packed in a metal carrying case. Price..... $21.25**

***Set No. 31*** **contains six of the most popular sizes (the Nos. 2814, 2816, 2818, 2820, 2822 and 2824). Price..... $12.15**

***Set No. 29*** **contains one each of the three short type wrenches, the Nos. 2804, 2805 and 2806, which will take care of the six most commonly used nuts and bolts. Price..... $5.10**

**MAY BE PURCHASED INDIVIDUALLY IF DESIRED**

| No. | U.S.S. Bolt Size | Hex. Head Cap Screw | S.A.E. Screw and Nut | Openings | Length | Thickness Head | Price Each |
|---|---|---|---|---|---|---|---|
| 2804 | ..... | 3/8 x 1/2 | 1/4 | 7/16 x 7/16 | 5 | 5/16 | $1.40 |
| 2805 | 1/4 | 7/16 x 5/8 | 5/16 | 1/2 x 1/2 | 6 1/16 | 3/8 | 1.50 |
| 2806 | ..... | 7/16 x 5/8 | 3/8 | 9/16 x 9/16 | 6 | 3/8 | 1.70 |
| 2814 | ..... | 1/2 | 7/16 | 5/8 | 8 | 7/16 | 1.60 |
| 2816 | 3/8 | 9/16 | 1/2 | 11/16 | 9 | 7/16 | 1.70 |
| 2818 | ..... | 5/8 | 9/16 | 3/4 | 9 1/16 | 1/2 | 1.80 |
| 2820 | ..... | 11/16 | 5/8 | 13/16 | 10 | 1/2 | 1.90 |
| 2822 | 7/16 | ..... | 11/16 | 7/8 | 11 | 9/16 | 2.00 |
| 2824 | ..... | 3/4 | 3/4 | 15/16 | 11 1/16 | 9/16 | 2.15 |
| 2826 | ..... | 13/16 | ..... | 1 | 12 | 5/8 | 2.30 |
| 2828 | 1/2 | 7/8 | 7/8 | 1 1/16 | 12 1/16 | 5/8 | 2.55 |
| 2830 | ..... | 15/16 | 15/16 | 1 1/8 | 13 1/16 | 5/8 | 2.75 |

**(Double End Box Wrenches 12 Point or Double Hex.)**

*The leading Jobbers carry these wrenches in stock.*

**BONNEY FORGE & TOOL WORKS**

ALLENTOWN, PA.

*Makers of Special Service Wrenches of Chrome Vanadium, Carbon Steel Drop Forge Wrenches, Pipe Wrenches, Vises and Drop Forgings and the Bonney Rim Tool.*

*CV is a Bonney trademark registered in the U. S. Patent Office

Chrome Vanadium registered August, 11 1925

Patents Pending